BETHEL TEST FISHING PROJECT, 1989

By

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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (continued)

LIST OF APPENDICES

ABSTRACT

Prior to 1984 total run abundance of chinook, sockeye, coho, and chum salmon in the Kuskokwim River was indexed using a set gill net test fishery and commercial catch statistics, but these two measures did not adequately relate to each other. Consequently, a drift gill net test fishery was initiated near Bethel in 1983 to provide more reliable catch per unit effort (CPUE) data. However, because of its location the Bethel test fishery indexed passage out of statistical area 335-11 instead of total run abundance.

Methodology used in the Bethel test fishery has remained essentially unchanged since 1984. Results of the 1989 season were influenced by a fishermen's strike which occurred early in the season.

The distribution of mean tidal CPUE generally followed some degree of temporal discontinuity beyond what could be attributed to commercial harvest. Abundance of chinook and sockeye salmon occurred in a series of pulses, each generally spanning several tides. Coho distribution demonstrated more of a tidal influence. Chum salmon abundance initially appeared as a pulsing pattern, but it quickly became smoother, interrupted only by commercial fishing periods. The discontinuity in the distribution of chinook, sockeye and coho salmon CPUE hindered attempts to calculate the catchability adjustment factors which have been used historically to enhance abundance comparison between years. Consequently, data analysis for these species is limited to the use of unadjusted data. However, catchability estimates were calculated for chum salmon and adjusted CPUE were used for abundance comparisons between years.

Cumulative unadjusted CPUE's for chinook, sockeye and coho salmon were 523.41, 800.93, and 2451.28, respectively. The chinook CPUE was above average, reflecting the influence of the fishermen's strike, plus a recent trend towards increasing chinook salmon abundance. In contrast, sockeye CPUE was the second lowest ever recorded by the Bethel test fishery, despite the positive influence of the strike on escapement. Cumulative CPUE for coho salmon was intermediate compared to other years, above other odd years, but below even years. For chum salmon, the cumulative adjusted CPUE, as well as the unadjusted CPUE, were intermediate.

INTRODUCTION

The primary objective of Pacific salmon (Oncorhynchus spp.) management is to ensure adequate spawning escapement by regulating harvest. Successful management requires accurate and timely knowledge about the abundance of the exploited populations. In the Kuskokwim River, stocks of chinook (O. tshawytsha), sockeye (O.nerka), coho (O.kisutch) and chum (O. keta) salmon are the targets of intense periodic fishing pressure as they migrate up the river towards their spawning grounds. The Bethel test fishery is designed to assist in-season management of these salmon stocks by providing fishery managers with an index of run timing and abundance.

Fishery Description

Commercial Fishery

The Kuskokwim River commercial salmon fishery is primarily directed at chum and coho salmon. Chinook salmon have not been subjected to a directed commercial fishery since 1987 because of conservation concerns; however, substantial numbers of this species are caught incidentally during commercial openings. Sockeye salmon have a naturally low abundance in the Kuskokwim drainage so catches of this species are also incidental. Harvests of pink salmon (O. gorbuscha) are negligible and not considered in this report.

Gill nets are the gear type used in the commercial fishery. Drift gill nets are the most common method employed but set gill nets are also legal. The stretched mesh size used is restricted to 15.2 cm (6 in) or smaller. This mesh restriction has been imposed since 1985 as an attempt to correct declining chinook salmon escapements. Results of this and other conservation measures have been encouraging as the recent trend in chinook salmon abundance has been increasing (Francisco, et al. 1989).

Commercial fishing in the Kuskokwim River occurs in two separate districts. Most commercial harvest occurs in District 1 (statistical areas 335-11, 335-12 and 335-13) which extends from the Kuskokwim River mouth approximately 238 km (148 mi) upstream to the confluence of Bogus Creek (Figure 1). District 2 (statistical area 335-20) includes 113 km (60 mi) of river between High Bluffs and Chuathbaluk. The sections of the Kuskokwim River between Districts 1 and 2, and that portion of the river above District 2, are closed to commercial fishing.

Although commercial fishermen are not restricted from fishing in any Kuskokwim Area commercial fishing district, most effort is concentrated in District 1 (especially statistical area 335-11) where as many as 679 units of gear have been utilized during a

single 8-hour commercial opening (Francisco, et al. In Press). This amount of active drift gear probably results in a saturated fishing district, a conclusion supported by observations that most of the harvest occurs within the first three to four hours of each opening (Huttunen 1988).

Subsistence Fishery

Subsistence is a vital element to the predominant life style in the Kuskokwim Area, and state law mandates that subsistence needs have priority over commercial use of the fisheries resources. The subsistence salmon fishery is especially significant along the Kuskokwim River where the number of chinook salmon taken for subsistence purposes is typically double the number taken commercially, and the number of subsistence-caught chum salmon usually approaches half that of the commercial catch (Francisco, et al. 1989).

The types of gear used by subsistence fishermen are generally similar to the gear used for commercial fishing. However, set gill nets are more prevalent in the subsistence fishery, and there is no restriction on mesh size.

Subsistence fishing occurs throughout the Kuskokwim River including many of the major spawning tributaries, but over half of all subsistence fishing occurs in that portion of District 1 located downstream of the Bethel test fishery in statistical area 335-11 (Francisco, et al. 1989). Subsistence fishing in District 1, and between Districts 1 and 2, is closed 16 hours before, during and 6 hours after each commercial salmon fishing period [1]. In District 2 the subsistence fishery is closed 24 hours before, during and 6 hours after each District 2 commercial fishing period. Subsistence fishing above District 2 is open 7 days a week with no closures.

Project Background

From 1966 through 1983 the Department conducted a set gill net test fishery in the lower reach of the Kuskokwim River near an abandoned fish camp called Kwegooyuk (Huttunen 1984a). The Kwegooyuk test fishery was designed to index run timing and total run abundance chinook, sockeye and chum salmon. This portion of the river ranged from approximately 5 to 7 km wide and had a major channel along both the east and west shores. Gill nets, 49 m in length, were set from the east shore just upstream of the lower boundary of District 1 and fished 24 hours a day.

[1] Kuskokuak Slough is an exception to the subsistence fishing rules in District 1. Subsistence fishing in the slough may begin as soon as the commercial fishing period is over (i.e., no 6 hour delay). The slough is also closed to commercial fishing.

Although the Kwegooyuk test fishery did adequately depict run timing, it was not able to satisfactorily index total run abundance of salmon. This problem was attributed to fluctuations in the preferred migratory route of salmon as influenced in-season by changes in weather patterns, and between seasons by alterations in the cross-sectional profile of the channel (Huttunen 1984a). In addition, the remoteness of the location made proper sale or distribution of each days catch difficult, or impossible, and often resulted in unavoidable wastage (Francisco, personal communication). The test fish program was redesigned in July, 1983 to use drift gill nets near Bethel instead of set gill nets near Kwegooyuk (Huttunen 1984).

The first trial of the new drift gill net test fishery was directed at collecting run timing and abundance information for coho salmon in 1983. Drifts were conducted in the main stem Kuskokwim River about 5 km (3.5 mi) upstream from Bethel, near the boundary line separating statistical areas 335-11 and 335-12. The river was approximately 1 km wide at the new location and had a single major channel[2] that allowed mobile drift gill nets to collect accurate catch per unit effort (CPUE) data across the entire channel width. The new location was also convenient to outlets for sale or distribution of each days catch. The drift gill net portion of the 1983 test fishery offered a more reliable means of monitoring run timing and salmon abundance than the Kwegooyuk test fishery; therefore, the historic set gill net program was replaced in 1984 with a multiple mesh drift gill net project referred to as the Bethel test fishery[3] (Huttunen 1985).

Relocation of the test fishery upriver of the commercial and subsistence fishing effort that occurs in statistical area 335-11 altered the component of the run indexed by the project. Instead of indexing total run abundance, as was the objective of the Kwegooyuk test fishery, the Bethel test fishery indexes passage of salmon out of statistical area 335-11. This distinction is important.

Approximately 60% of the commercial salmon harvest in the Kuskokwim River occurs downstream of the Bethel test fishery. This harvest is not accounted for in the test fish index. Neither is the subsistence harvest of statistical area 335-11. Furthermore, the mortality rate induced by the commercial fishery is probably inconsistent because of changes in gear efficiency, changes in regulations designed to alter harvest efficiency, variability in fishing pattern (length of openings and frequency of openings), variability in the synchrony of openings with the entry pattern of

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[2] Two small channels, Straight Slough and Steamboat Slough, circumvent the site but are considered minor contributors to fish passage (Huttunen, personal communication).

[3] Also referred to as the Kuskokwim test fishery.

salmon, and the occurrence of fishermen's strikes. These inconsistencies confound the ability of the project to index total run abundance. Still, the Bethel test fishery provides an alternate but equally valuable tool for salmon management.

As mentioned earlier, the primary objective of salmon management is to insure adequate spawning escapement through harvest regulation. Due to the distances involved, spawning escapement in the Kuskokwim drainage generally can not be assessed directly until weeks after management decisions on harvest regulation have been made. The Bethel test fishery serves as an early index of passage rates available in time to be useful for management needs.

Local commercial fishing interests, concerned that the Bethel test fishery was inadequate in providing timely and accurate run information, solicited the Department to cosponsor another test fishing project near the old Kwegooyuk site. This project, known as the Eek or Industry test fishery, began in 1988 and will be discussed in a separate report.

Objectives

This report describes how the 1989 Bethel test fishery was conducted, presents results and provides some discussion about the results.

METHODS

1989 Test Fishing

The methods and location used in the 1989 Kuskokwim River gill net test fishery were the same as those used since 1984. Following each high tide a series of four drifts were conducted near Bethel by a two-person crew using a 6.1 m (20 ft) skiff and 90 m (50 fathom) gill nets. Each series of drifts began one hour after the published high slack tide for Bethel. The one hour delay insured that all drifts were conducted in water flowing downstream. Drifts were made in a 3 km (2 mi) section of river just above the boundary separating statistical areas 335-11 and 335-12 (Figure 1). All drifts began approximately 5 km (3.5 mi) upstream of Bethel, near the point were Straight Slough diverges from the main channel. Each drift was made at one of three stations across the width of the main channel (Figure 2). To avoid conflict with commercial fishermen no drifts were conducted during commercial fishing periods.

Gill net drifts began at the Bethel test fish site on 1 June and continued through the morning tide on 31 August. From 1 June

through 10 July two different mesh sizes where used in the test fishery. The first two drifts of each tide were conducted with 20.3 cm (8 in) stretched mesh gill nets and the second two drifts were made with a smaller 13.6 cm (5-3/8 in) mesh. Different mesh sizes were used because the larger mesh selected for larger chinook salmon while the smaller mesh was more effective on smaller chinook as well as other species of salmon. A repeating random schedule of six unique permutations was used to determine the mesh size fished at each station such that no station was fished with the same mesh size twice during a single tide (Table 1).

After 10 July the chinook salmon migration in the lower Kuskokwim River was essentially over so use of the larger 20.3 cm mesh nets was discontinued and all four drifts were conducted with the smaller 13.6 cm mesh. Four drifts continued to be made and the fishing schedule described above was maintained. This ensured that the one duplicated drift was distributed randomly between stations.

The gill nets used in the test fishery were hung at a 2:1 hanging ratio. The 13.6 cm mesh webbing was constructed of 6 strand centercore 0.5 mm monofilament twine and the 20.3 cm mesh webbing was constructed of 36 strand monofilament. Both web types were manufactured by Nagura Net Company.

Each drift took approximately 30 minutes to complete and all fish caught were tallied by species and by station. Healthy chinook salmon were released and the remainder of the catch was sold to a local processor or donated to individuals desiring the fish for personal use. Age, sex and size data were not generally collected.

Standardized Catches

Actual catches were converted to CPUE by considering the amount of effort (in both length of net and soak time) used to capture fish. Each CPUE index (I) was expressed as the number of fish which would have been caught if 180 m (100 fathoms) of net had been fished for exactly 60 minutes, a standard used in many gill net test fisheries statewide (Meacham 1978; Waltemyer 1983). Each CPUE index (I) was computed as:

$$I = 6{,}000\ C\ (L\ T)^{-1}$$

where C is the catch of each species in numbers of fish, L is the length of net used in fathoms, and T is the mean fishing time in minutes. Mean fishing time was defined as half the time it took to both set and retrieve the net, plus the time that the entire net was fishing.

The catches for each tide were combined over all stations to calculate a mean tidal CPUE index (I_t) for each species. When both

20.3 cm and 13.6 cm nets were used estimation of tidal chinook salmon abundance was calculated by weighing CPUE data from all drifts equally. The formula was:

$$I_i = n^{-1} \left(\sum_{j=1}^{n} I_{i,j} \right)$$

where $I_{i,j}$ is the chinook salmon CPUE index from drift j on tide i, and n is the number of drifts actually conducted, which should equal four. In contrast, during the same time period, only catches in the 13.6 cm mesh nets were used to calculate mean tidal CPUE's of sockeye, coho, and chum salmon; therefore, the number of drifts (n) should equal two.

Catch data from missed drifts not affected by commercial openings were linearly interpolated from the preceding and following tidal data. Drift information missing due to a commercial fishing period was estimated as being equal to the test fish drifts of the following high tide only.

Estimated and actual tidal CPUE's were summed by species throughout the period of data collection to generate total annual CPUE indices (I):

$$I = \sum_{i=1}^{n} I_i$$

where n is the total number of tides which occurred throughout the course of the project.

Migratory Timing

The mean date of migration (t) as defined by Mundy (1982) was calculated for each species as:

$$t = \sum_{i=1}^{n} (t_i \; p_i)$$

where t_i is the coded date of migration and p_i is the daily proportion of test fishing CPUE indices observed on day i. The daily proportion of CPUE indices is calculated as:

$$p_i = I_i \; I^{-1}$$

The variance about the mean date of migration (s_t^2) was calculated as:

$$s_t^2 = \sum_{i=1}^{n} (t_i - t)^2 P_i$$

A relatively small variance indicates that the salmon migration was compacted, whereas a larger variance means fish occurred in substantial numbers over a longer period of time.

Species Composition

Species composition in the test fishery was calculated on a daily basis and expressed as a fraction of the summed mean daily CPUE indices of all species pooled across all stations.

Spatial Distribution

Seasonal abundance by station was calculated by summing specific CPUE indices at each station across all tides fished. This was appropriate because of the regular rotation of stations sampled through 10 July when two different mesh sizes were fished. After 10 July all stations were sampled with 13.6 cm mesh gear only.

Catchability

Raw test fishing CPUE's were adjusted to account for changes in mean annual catchability for each species using methodology developed by Huttunen and Brannian (1987) and discussed in detail by Brannian (1988). Application of this technique enhances the validity of 'between year' comparisons of annual CPUE by accounting for confounding effects such as saturation of test fish gill nets and the variable efficiency of the test fishing crew.

The catchability adjustment relates specific downstream commercial catch statistics to observed declines in test fishing CPUE immediately following a commercial fishing period. Unexploited relative abundance (I) within the statistical area during commercial fishing period j was estimated using peak-to-peak interpolation between the mean test fishing CPUE on the two (i^{th}) tides before an opening and that from the first two tides following the recovery of CPUE's to unharvested levels. The formula was:

$$\hat{I}_j = K\, m^{-1} \left(\sum_{k=1}^{m} I_{jk}\right)$$

where k is the number of tides used to interpolate within, m is usually four (the two tides of unexploited CPUE before a commercial fishing period and the two tides of unexploited CPUE following a commercial fishing period), and K is the number of tides with depressed or 'exploited' CPUE. Catchability (C) at the test

fishery during commercial fishing period j was described as a function of the known harvest as:

$$C_j = 0.01\ [H_j\ (\hat{I}_j - \sum_{k=1}^{p} I_r)^{-1}]$$

where H_j is the downstream harvest in statistical area 335-11, p is the number of tides with depressed test fishing CPUE due to commercial harvest removal (usually three or four), and I_r is the actual CPUE remaining during each tide of 'exploited' test fishing.

The catchability adjustment factor (C_j) was calculated for each commercial fishing period that conformed to the assumptions described by Brannian (1988). The mean C_j was then calculated as a cumulative average as the season progressed and multiplied across all mean tidal CPUE's to yield 'adjusted' mean tidal CPUE's. These adjusted CPUE's were considered standardized for year to year variability in parameters which influence catchability.

RESULTS AND DISCUSSION

The 1989 test fishery began on 1 June, several days before any substantial numbers of returning salmon were observed near the Bethel site (Figure 3). By the end of the season a total of 638 drifts were made and the total catch consisted of 314 chinook, 301 sockeye, 1,703 coho and 1,101 chum salmon (Table 2, Appendix A). Chinook, sockeye and chum salmon migrations ended long before the test fishery was concluded, but small numbers of coho salmon did persist in the catches through the end of the program. Nevertheless, a pronounced decelerating entry pattern had been established for coho salmon, suggesting that the overwhelming majority of coho had passed through the test fishing site before the test fishery ended.

Some of the results of this years test fishery were influenced by the development of a fishermen's strike early in the season. The first commercial fishing period opened 19 June with an effort of 374 boats, down from the typical range of 575 to 600 boats. The strike gained momentum through the third period, 26 June, when effort decreased to 126 boats.

For some species the strike resulted in an irregular pattern of mean tidal CPUE indices which restricted reliable calculation of catchability adjustment factors. The odd CPUE patterns were in part caused by an abnormal fleet distribution as fishermen not participating in the boycott avoided some usual fishing locations in an attempt to evade harassment by strikers. Details for each species will be described below.

Chinook Salmon

Temporal Distribution

Chinook salmon were observed in the Bethel test fishery for a period of 75 days, 7 June to 20 August, but 87% of the test fish catch occurred during the last 24 days of June (Table 2). The mean date of migration (t) and mean date variance (s^2_t) were 24.3 June and 389.0 (Appendix B). These values closely approximate the respective five year averages of 23.7 June and 346.7, suggesting the run timing and temporal distribution in the test fishery were average.

Test fish catches of chinook salmon demonstrated a discontinuous pattern of abundance which could not be solely attributed to commercial harvest. Instead, these periods of abundance appeared to occur in natural pulses. Each pulse had a pattern of increasing CPUE, a peak then a step-wise reduction in CPUE (Figure 4). The first pulse peaked on tide 19. A second stronger pulse peaked on tide 26 and a third even stronger pulse peaked on tide 34. This third peak occurred on the second tide of 18 June.

The commercial fishery began on 19 June confounding recognition of additional pulses in the chinook salmon migration; still, some evidence of the pulse pattern remained detectable. For instance, the eight tide depression of mean tidal CPUE from tide 36[4] through tide 43 far exceed the two to four tide removal expected from the preceding commercial fishing period (Huttunen 1985, Brannian 1988). The latter portion of the CPUE depression probably represented an actual drop in abundance following the third pulse of chinook salmon entry into the river. Some commercial fishermen began to strike on this opening, but the effect on harvest appeared to be minimal.

The fourth and strongest pulse began abruptly on tide 44, which immediately followed a commercial fishing period influenced by the growing momentum of the fishermen's strike (Figure 4). This increase in test fishing CPUE immediately following a commercial fishing period was atypical and probably a result of non-striking fishermen avoiding strikers in the Bethel area. This affectively made the area for several miles down stream of the test fish site a refugium for migrating salmon. However, the effect of the commercial harvest that occurred below the refugium is illustrated in tides 45, 46, 47 and possibly 48 by the occurrence of the 3 or 4 tide depression in test fish CPUE typical of what is expected following a commercial fishing period (Huttunen 1985).

[4] Tide 36 was an estimate.

By tide 48 or 49[5] the fourth pulse of king salmon past the test fish site regained it's momentum and the magnitude of this pulse of fish becomes more apparent. Even under the influence of commercial fishing effort on 26 June (which was strongly reduced due to the strike) test fish CPUE for chinook salmon remained very high for four consecutive tides following the commercial opening. If it were not for the effect of the 26 June harvest this pulse of fish may have exceeded the 18 June spike and most likely represents the overall peak of the chinook salmon migration past the Bethel test fish site.

By tide 53 the fourth pulse of chinook salmon was on the decline, bottoming out on tides 54 and 55 (Figure 4). A sixth, smaller pulse began on tide 56, but it was quickly depressed the following tide by the first commercial fishing period following the strike settlement. Additional pulses in test fish CPUE attributable to the natural migratory pattern of chinook salmon are difficult to reliably detect because of the decreasing numbers of chinook salmon occurring in the test fishery and the close temporal proximity of commercial fishing periods.

Local fishermen are well aware of these temporal pulses in salmon abundance. They attribute them to changes in weather patterns such as the development of storm fronts in Kuskokwim Bay, especially if the storms are accompanied by strong southerly winds. It is possible that the subsistence fishery also influences the occurrence of these peaks, but the effect of subsistence fishing is unknown and assumed here to be minimal or uniform. Fishery managers and researchers need to be aware of these pulses because of their affect on interpreting test fish results.

Catchability

A reliable estimate of chinook salmon catchability could not be calculated in 1989 because the entry pattern violated assumptions upon which the catchability estimate is based (Brannian 1988, Huttunen 1988). Specifically, the entry pattern was discontinuous and declines in test fishing CPUE following commercial openings could not be solely attributed to the influence of commercial harvest.

Passage Index

Passage of chinook salmon out of statistical area 335-11 in 1989, as indexed by the cumulative unadjusted mean tidal CPUE, was the second highest on record (Figure 5). This near record high index of chinook escapement was also reflected in spawning ground

[5] Tide 49 was an estimate.

escapement. For example, the escapement of chinook salmon at Kogrukluk River weir this year was the highest observed since 1982 (Schneiderhan 1989a). Similarly, the overall escapement observed in the Kuskokwim River Aerial Index was the highest recorded since 1981 (Francisco, et al. In Press). Furthermore, even with the strike and above average escapements, the 1989 commercial catch of chinook salmon in the Kuskokwim River of 43,217 fish was above the 1984-88 average of 36,188 fish (Francisco, et al. In Press). Together these observations suggest that the overall return of chinook salmon to the Kuskokwim River in 1989 was well above average.

Species Composition

The proportion of chinook salmon in the test fishery, as indexed by the mean daily CPUE, was variable but typically small (Figure 6). The proportion of chinook peaked between 9 and 17 June followed by a rapid decline. In the commercial fishery, the proportion of chinook salmon peaked on 19 June, the first commercial fishing period, and was followed by a decline similar to that observed in the test fishery.

Gear Selection

Chinook salmon were caught in both the 20.3 cm and 13.6 cm mesh gill nets (Table 3). The smaller gear accounted for 62.74% of the catch which is similar to the 1984-88 average of 60.61%.

Spatial Distribution

The distribution of chinook salmon between stations I, II and III differed modestly from the 1984-88 average, but was generally within the range of past observations (Table 4). In 1989 the distribution was 65.24%, 7.21% and 27.56% for station I, II and III respectively while the 1984-88 averages are 52.95%, 19.11% and 27.94%.

Sockeye Salmon

Temporal Distribution

Catches of sockeye salmon occurred in the Bethel test fishery for a period of 44 days, 6 June to 19 July, but the final 20 days of June accounted for 82% of the catch (Table 2). Mean date of migration (t) and mean date variance (s^2_t) were 24.2 June and 193.2. These statistics were comparable to respective averages from the previous four years of 26.6 June and 194.7, but the variance in 1989 was much lower than the four year median of 213.7 (Appendix

B). The low median indicates that the sockeye run was more compacted in 1989 than in most previous years. This compactness was also illustrated in a comparison of annual cumulative CPUE curves (Figure 7).

Discontinuity in the pattern of mean tidal test fish CPUE for sockeye salmon could not be solely attributed to commercial harvest. Instead, early in the season the CPUE pattern occurred as pulses similar to what was described for chinook salmon. The first pulse peaked on tide 20 (Figure 8). This pulse was atypical in comparison with most other pulses because it was defined by a single tide of abundance with no building or falling pattern. This brief spike could be a manifestation of sampling error, but the hypothesis of it being real gains support due to its' co-occurrence with more well defined pulses in chinook and chum salmon CPUE.

The second pulse in sockeye CPUE was more well defined. Peak abundance occurred on tide 26, preceded by three tides of building CPUE and followed by seven tides of generally declining CPUE. This pulse also co-occurred with similar periods of abundance in chinook and chum salmon CPUE.

The third pulse in sockeye CPUE occurred abruptly on tide 34. Again, the timing was similar to pulses identified for other species. The pattern was disrupted on tide 36 by the occurrence of the first commercial fishing period. Thereafter the CPUE index for sockeye was erratic and confounded by the occurrence of additional commercial fishing periods, the strike, and small sample sizes.

Catchability

A reliable catchability adjustment factor could not be calculated for sockeye salmon in 1989. The entry pattern, as reflected in mean tidal CPUE, was discontinuous, therefore violating assumptions upon which catchability estimates are based (Brannian 1988, Huttunen 1988). The causes of the irregularity include random error due to the small numbers of sockeye occurring in the test fishery, pulsing entry pattern, and an atypical commercial harvest pattern and fleet distribution as affected by the strike.

Passage Index

The 1989 passage of sockeye salmon out of statistical area 335-11 was the second lowest sockeye passage estimate by the Bethel test fish index (Figure 7). This happened despite the fishermen's strike co-occurring with the peak of the sockeye run, suggesting the overall sockeye run in 1989 was poor. This hypothesis is reinforced by the 1989 commercial sockeye salmon harvest of 42,747 which was the lowest catch recorded for the Kuskokwim River since

1982 (Francisco, et al. In Press). Furthermore, no sockeye were observed during the spawning ground survey of Telaquana Lake, a major producer of sockeye in the Kuskokwim drainage (Schneiderhan 1989b).[6] Results at Kogrukluk River weir were contradictory; sockeye escapement was above the 1984-88 average and 291 percent of the objective escapement (Schneiderhan 1989a).

Species Composition

The proportion of sockeye salmon in the test fishery, as indexed by the mean daily CPUE, was variable but generally the greatest between 12 and 22 June (Figure 9). During this time the proportion of sockeye ranged from 23.83% and 44.35% (Table 5). Beyond 22 June the proportion of sockeye generally declined as chum salmon became more prevalent in the catch. The occasional resurgence of sockeye proportion observed late in the season was probably a manifestation of small sample size coupled with a difference in the species selectivity between the test fishery and commercial fishery.

As in past years, sockeye salmon in 1989 generally comprised a much larger fraction of the test fish catches than of the District 1 commercial catches (Huttunen 1988). This is probably a result of differences in the selectivity of fishing gear. Still, both fisheries demonstrate a similar trend of declining proportion.

Spatial Distribution

The distribution of test fish CPUE for sockeye salmon was consistent with the historic average (Table 4). Station I had the greatest percentage of CPUE, 60.72 %. The 1984-89 average for station I was 55.71%. The CPUE for sockeye salmon at stations II and III were 25.65% and 13.63% and the respective 1984-89 averages were 23.17% and 21.12%.

Coho Salmon

Temporal Distribution

Coho salmon occurred in Bethel test fish catches for 50 days, 13 July through the end of the project on 31 August. However, 83% of the catch occurred during 12 days beginning 31 July (Table 2). Mean date of migration (t) was 5.6 August, the earliest date yet recorded in the test fishery (Appendix B). The mean date variance (s^2_t) was 173.9, comparable to the average of 187.7 from the previous five years.

[6] Reliability of the survey was reduced because of water turbidity.

During most of July the mean tidal CPUE was below 10, but on 31 July the CPUE surged to 271.62, the highest coho CPUE for the season (Figure 10). The surge is associated with a change in weather pattern. Weather from 22 to 27 July was mostly calm and sunny. By 28 July wind velocity began to increase from a southerly direction accompanied by rain. Fishermen generally attributed the surge in coho abundance to this weather change, but no analysis has been done to confirm the belief.

Mean tidal CPUE continued to be relatively high, but volatile, from 31 July through 12 August (Figure 10). Part of the volatility was due to commercial fishing effort which depressed the CPUE for 2 or 3 tides following commercial periods, but other declines could not be attributed to commercial harvest. Instead, the CPUE index followed an alternating pattern of high and low values that may have been attributed to tidal rhythms. Based on the Bethel tide table, high CPUE's corresponded to the daily low high tides and low CPUE's corresponded with the daily high high tides. This pattern was disrupted during tides affected by commercial harvest.

Beyond 13 August the mean tidal CPUE generally indicated low passage of coho salmon out of statistical area 335-11 (Figure 10). However, on 23 August the commercial harvest of coho salmon in statistical area 335-12 showed a substantial increase not reflected by the test fishery (Figure 10, Appendix C). This increased harvest was also associated with a comparable rise in the commercial CPUE (Francisco, et al. In Press). A similar situation occurred on 12 August (Figure 10).

This lack of corroboration between the Bethel test fish index and the commercial harvest was not typical. For other species of salmon the pattern of abundance observed in the test fishery does reflect the pattern of abundance found in the commercial harvest, hence validating results from the test fishery. The reason for the discrepancy with coho salmon is unknown, but one hypothesis is that the coho were deeper in the water column than usual during the two time frames in question, thereby passing below the test fish gill nets. This hypothesis will hopefully be tested in 1990 by conducting experimental drifts with deep gill nets.

Catchability

A reliable estimate of coho salmon catchability could not be calculated in 1989 because the entry pattern violated assumptions upon which catchability estimates are based (Brannian 1988, Huttunen 1988). Specifically, the entry pattern was discontinuous and declines in test fishing CPUE following commercial opening could not be solely attributed to down river commercial harvest.

Passage Index

The cumulative unadjusted mean tidal CPUE for coho salmon in 1989 was intermediate compared to other years (Figure 11). This index of passage out of statistical area 335-11 was high relative to other odd years, but low compared to even years. Commercial harvest of coho salmon in the Kuskokwim River showed a similar pattern of relative abundance (Francisco, et al. In Press). No spawning ground escapement data is available for comparison.

Species Composition

The daily fraction of coho salmon in the test fishery varied but generally increased rapidly between 12 and 26 July when the proportion of coho CPUE escalated from 0 to 100% (Figure 12, Table 5). The proportion stayed at, or near 100% for the remainder of the season. The percentage of coho in the commercial catch was similar, but demonstrated a smoother transition.

Spatial Distribution

Coho salmon were more evenly distributed across the channel this year than in previous years (Table 4). The percentage of coho CPUE between stations I, II and III was 35.40, 35.42, and 29.17,respectively. The respective 1984-89 averages are 60.47%, 19.03% and 20.50%. The cause of the difference is unknown, but because test fishing methods have remained essentially unchanged since 1984, the difference is assumed to be caused by natural variation in migratory patterns.

Chum Salmon

Temporal Distribution

Chum salmon occurred in the Bethel test fishery for a period of 70 days, 1 June through 9 August, but 81% of the catch occurred during 26 days, 19 June through 14 July (Table 2). The mean date of migration (t) was 30.7 June, the earliest date recorded for the test fishery (Appendix B). Mean date variance (s^2_t) was 349.1, comparable to the 1984-88 average of 344.4.

The pattern of mean tidal test fish CPUE for chum salmon was initially discontinuous and could not be solely attributed to commercial harvest (Figure 13). Instead, the CPUE appeared to follow a pulsing pattern similar to what has been described for other species. The first distinct pulse peaked on tide 28. A second stronger pulse peaked on tide 35, but may have been cut short because of the occurrence of the first commercial fishing period during tide 36. Some commercial fishermen began to strike

on this opening, but the effect on harvest appeared to be minimal. Tides 36[7], 37, 38 and 39 were all influenced by the commercial harvest and illustrate the typical depression of test fish CPUE following a commercial period. By tide 40 the test fish CPUE appeared to have recovered from the influence of the commercial fishery and followed a steady pattern of decreasing CPUE through tide 43.

The third and strongest pulse in test fish CPUE began abruptly on tide 44 which immediately followed a commercial fishing period (Figure 13). An increase in test fish CPUE immediately following a commercial fishing period is unusual and attributed to the growing boycott by fishermen. Details of the strike's influence described for chinook salmon also apply for chum salmon. The validity of these pulses were reinforced by their co-occurrence with pulses observed in the test fish CPUE for chinook and sockeye salmon.

Beyond the third pulse test fish CPUE for chum salmon followed a relatively continuous patten of decreasing CPUE (Figure 13). The pattern was punctuated with periods of depressed CPUE attributable to commercial fishing effort. This consistency allowed estimates of catchability to be calculated.

Catchability

The 1989 catchability adjustment factor for chum salmon of 5.0003 was above the 1984-88 average of 3.9109, but within the historic range of values (Appendix D). The adjustment factor was based on data from commercial fishing periods occurring on 19 June and 5, 8, 11 and 14 July. The number of succeeding tides affected by these commercial periods were estimated to be 4, 4, 2, 3 and 4, respectively. Other fishing periods were excluded because of the violation of assumptions upon which catchability is based.

Passage Index

The cumulative adjusted mean tidal test fish CPUE for chum salmon in 1989 was intermediate compared to other years (Figure 14). The 1989 CPUE was below 1988 and 1987 but above 1986, 1985 and 1984. A nearly identical ranking of annual abundance was observed in the commercial catch for statistical area 335-12 (Appendix E). In contrast, the Aniak sonar and Kogrukluk River weir indicated chum salmon escapement to the spawning grounds in 1989 was above 1987 and below 1984 (Schneiderhan 1989a, 1989b).

[7] Tide 36 was an estimate.

Species Composition

Chum salmon dominated the test fish catch during late June and throughout most of July (Table 5, . 15). The daily proportion of chum salmon CPUE in the test fishery was lower and more variable than the chum proportions in the commercial catch; however, both sets of data indicated a similar pattern of relative abundance throughout the season.

Spatial Distribution

The distribution of chum salmon between stations I, II and III was similar to the 1984-88 average (Table 4). The 1989 distribution was 49.91%, 32.98% and 17.17% for stations I, II and III, respectively, while the 1984-88 averages were 49.09%, 27.00% and 23.91%.

Hydrological Data

Hydrologic data were collected during each tide in which test fishing occurred. Observations included both water temperature (at approximately 0.5 m depth) and clarity readings. Water temperatures averaged 8.75°C during AM tides and 6.71°C during PM tides (Table 6). Temperatures ranged from 9 to 18°C. Secchi depth readings ranged form 0.10 to 1.00 m averaging 0.31 m in the AM and 0.18 m in the PM.

Bottom profile data was collected at the test fish site in 1988. The channel was U-shaped with maximum dimensions of 14.3 m (47 ft) deep and 320 m (1,050 ft) wide (Figure 16). Gill nets used in the Bethel test fishery generally sampled the upper 33 to 50% of the water column; however, at station I the inshore end of the net generally dragged along a section of sand bar. At station III the in-shore end of the net was initially deployed approximately 8 m (24 ft) offshore to avoid snags along the channels edge. As the drift progressed the net moved towards the center of the channel (Figure 2). The actual distance covered by a drift varied with changes in water velocity.

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Table 1. Drift schedule, by mesh size (cm) and station, used in the 1989 Bethel test fishery.[a]

Schedule Number	Station 1	Station 2	Station 3
1	20.3	20.3	
	13.6		13.6
2	20.3	20.3	
		13.6	13.6
3	20.3		20.3
	13.6	13.6	
4	20.3		20.3
		13.6	13.6
5		20.3	20.3
	13.6	13.6	
6		20.3	20.3
	13.6		13.6

[a] Repeating random schedule used throughout the period of test fishing is: 2, 3, 5, 4, 1, 6.

Table 2. Test fishing catch and unadjusted mean tidal CPUE[a] by species for the 1989 Bethel test fishery.

Date	Tide No.	Chinook[b]		Sockeye[c]		Coho[c]		Chum[c]	
		Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
06/01	1	0	0.00	0	0.00	0	0.00	1	2.61
06/02	2	0	0.00	0	0.00	0	0.00	0	0.00
06/02	3	0	0.00	0	0.00	0	0.00	0	0.00
06/03	4	0	0.00	0	0.00	0	0.00	0	0.00
06/03	5	0	0.00	0	0.00	0	0.00	0	0.00
06/04	6	0	0.00	0	0.00	0	0.00	0	0.00
06/04	7	0	0.00	0	0.00	0	0.00	0	0.00
06/05	8	0	0.00	0	0.00	0	0.00	0	0.00
06/05	9	0	0.00	0	0.00	0	0.00	1	3.00
06/06	10	0	0.00	0	0.00	0	0.00	0	0.00
06/06	11	0	0.00	1	2.93	0	0.00	0	0.00
06/07	12	0	0.00	0	0.00	0	0.00	1	2.86
06/07	13	1	1.67	0	0.00	0	0.00	1	3.00
06/08	14	4	6.51	0	0.00	0	0.00	3	10.29
06/08	15	0	0.00	0	0.00	0	0.00	0	0.00
06/09	16	3	4.29	1	2.86	0	0.00	1	2.86
06/09	17	3	4.29	0	0.00	0	0.00	2	5.72
06/10	18	4	5.72	1	2.86	0	0.00	2	5.72
06/10	19	5	9.59	0	0.00	0	0.00	2	6.00
06/11	20	2	4.29	5	19.87	0	0.00	1	2.73
06/12	21	1	1.67	1	3.00	0	0.00	1	3.00
06/12	22	5	7.00	4	8.51	0	0.00	5	14.21
06/13	23	8	11.41	1	2.93	0	0.00	5	9.01
06/13	24	0	0.00	3	8.14	0	0.00	4	11.46
06/14	25	9	12.69	3	8.79	0	0.00	0	0.00
06/14	26	9	14.32	5	18.11	0	0.00	2	7.18
06/15	27	4	9.23	3	10.20	0	0.00	3	13.85
06/15	28	7	9.55	5	13.53	0	0.00	8	22.11
06/16	29	*	5.57	*	9.93	*	0.00	*	15.45
06/16	30	1	1.58	2	6.32	0	0.00	3	8.78
06/17	31	*	7.49	*	5.66	*	0.00	*	4.39
06/17	32	10	13.40	2	5.00	0	0.00	0	0.00
06/18	33	8	10.76	1	2.86	0	0.00	5	14.43
06/18	34	21	27.19	1	43.08	0	0.00	13	34.24
06/19	35	8	13.44	8	28.24	0	0.00	20	67.87
06/19	36	*	5.72	*	5.80	*	0.00	*	0.00
06/20	37	4	5.72	2	5.80	0	0.00	0	0.00
06/20	38	8	10.56	5	13.05	0	0.00	16	43.96
06/21	39	5	5.75	22	47.15	0	0.00	14	30.05
06/21	40	6	8.06	2	5.46	0	0.00	17	45.76
06/22	41	7	8.74	17	41.33	0	0.00	13	31.73
06/22	42	6	8.11	6	16.62	0	0.00	7	24.13
06/23	43	3	5.18	5	14.63	0	0.00	1	2.93
06/23	44	12	18.27	7	21.46	0	0.00	25	75.62
06/24	45	5	7.33	8	26.86	0	0.00	7	22.29
06/24	46	11	13.75	5	13.12	0	0.00	56	144.55
06/25	47	6	8.31	15	40.55	0	0.00	54	145.38
06/25	48	11	18.00	13	42.00	0	0.00	19	63.00
06/26	49	*	23.90	*	12.90	*	0.00	*	55.62
06/26	50	18	23.90	5	12.90	0	0.00	22	55.62
06/27	51	15	25.15	5	16.23	0	0.00	34	90.97
06/28	52	12	25.27	8	36.86	0	0.00	11	42.83
06/28	53	8	11.26	16	40.14	0	0.00	31	77.68
06/29	54	1	1.36	5	14.50	0	0.00	29	85.12
06/29	55	1	1.43	7	20.00	0	0.00	13	37.36
06/30	56	9	13.67	13	33.89	0	0.00	21	57.07
06/30	57	*	8.54	*	6.16	*	0.00	*	49.23
07/01	58	5	8.54	2	6.16	0	0.00	16	49.23
07/01	59	2	2.73	3	7.20	0	0.00	27	66.00
07/02	60	1	1.54	2	5.78	0	0.00	3	8.71
07/03	62	5	6.40	9	22.48	0	0.00	31	77.88
07/03	63	*	3.06	*	0.00	*	0.00	*	0.00
07/04	64	2	3.06	0	0.00	0	0.00	0	0.00
07/04	65	*	3.69	*	1.43	*	0.00	*	57.14
07/05	66	3	4.32	1	2.86	0	0.00	40	114.28
07/05	67	4	5.45	1	2.56	0	0.00	26	67.27
07/06	68	1	1.67	0	0.00	0	0.00	1	3.00

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Table 2. Test fishing catch and unadjusted mean tidal CPUE[a] by species for the 1989 Bethel test fishery (continued).

Date	Tide No.	Chinook[b]		Sockeye[c]		Coho[c]		Chum[c]	
		Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
07/06	69	0	0.00	1	2.67	0	0.00	19	56.00
07/07	70	2	2.80	4	10.93	0	0.00	19	50.93
07/07	71	4	5.92	1	2.56	0	0.00	25	65.73
07/08	72	2	3.64	5	15.33	0	0.00	20	61.30
07/08	73	0	0.00	0	0.00	0	0.00	1	3.64
07/02	61	1	1.90	2	5.71	0	0.00	20	57.70
07/09	74	2	3.23	1	3.00	0	0.00	4	11.93
07/09	75	1	1.36	0	0.00	0	0.00	16	45.05
07/10	76	1	1.46	0	0.00	0	0.00	15	40.05
07/10	77	2	2.79	0	0.00	0	0.00	9	26.34
07/11	78	*	0.00	*	2.14	*	0.00	*	3.29
07/12	79	0	0.00	2	2.14	0	0.00	3	3.29
07/12	80	1	1.03	1	2.50	0	0.00	2	3.53
07/13	81	0	0.00	2	4.17	0	0.00	16	31.62
07/13	82	0	0.00	0	0.00	1	1.95	19	22.78
07/14	83	0	0.00	0	0.00	0	0.00	14	27.32
07/14	84	*	0.00	*	0.00	*	1.86	*	7.58
07/15	85	0	0.00	0	0.00	1	1.86	4	7.58
07/15	86	0	0.00	0	0.00	0	0.00	2	3.05
07/16	87	0	0.00	1	1.90	0	0.00	3	5.71
07/16	88	0	0.00	3	5.60	0	0.00	8	14.71
07/17	89	1	1.14	1	1.08	2	2.23	11	12.26
07/17	90	0	0.00	0	0.00	0	0.00	3	4.86
07/18	91	1	1.86	0	0.00	2	2.86	9	15.81
07/18	92	*	0.00	*	1.25	*	0.00	*	7.60
07/19	93	0	0.00	1	1.25	0	0.00	5	7.60
07/19	94	1	0.88	0	0.00	0	0.00	4	8.63
07/20	95	2	5.16	0	0.00	5	11.32	9	23.23
07/20	96	0	0.00	0	0.00	1	1.21	4	5.50
07/21	97	0	0.00	0	0.00	0	0.00	1	2.58
07/21	98	1	0.93	0	0.00	7	10.37	7	10.37
07/22	99	1	1.11	0	0.00	5	5.69	3	4.33
07/22	100	3	5.13	0	0.00	7	8.86	2	3.08
07/23	101	0	0.00	0	0.00	3	5.58	4	7.44
07/23	102	0	0.00	0	0.00	1	1.08	6	5.97
07/24	103	0	0.00	0	0.00	1	1.95	0	0.00
07/24	104	0	0.00	0	0.00	2	3.90	0	0.00
07/25	105	0	0.00	0	0.00	0	0.00	2	2.23
07/25	106	0	0.00	0	0.00	2	4.00	1	2.00
07/26	107	0	0.00	0	0.00	1	1.00	0	0.00
07/27	108	0	0.00	0	0.00	2	2.29	0	0.00
07/27	109	*	0.00	*	0.00	*	1.70	*	0.00
07/28	110	0	0.00	0	0.00	1	1.70	0	0.00
07/28	111	0	0.00	0	0.00	3	8.14	0	0.00
07/29	112	0	0.00	0	0.00	1	1.03	1	1.33
07/29	113	0	0.00	0	0.00	4	7.80	0	0.00
07/30	114	0	0.00	0	0.00	8	8.33	0	0.00
07/30	115	0	0.00	0	0.00	18	27.82	0	0.00
07/31	116	0	0.00	0	0.00	211	271.62	9	13.03
07/31	117	0	0.00	0	0.00	37	61.84	1	1.08
08/01	118	0	0.00	0	0.00	102	168.87	3	4.59
08/01	119	0	0.00	0	0.00	27	41.67	1	1.78
08/02	120	0	0.00	0	0.00	196	258.18	2	3.02
08/02	121	1	1.11	0	0.00	94	134.32	4	4.83
08/03	122	0	0.00	0	0.00	63	83.53	2	3.81
08/03	123	0	0.00	0	0.00	1	1.95	0	0.00
08/04	124	0	0.00	0	0.00	7	8.02	1	0.96
08/04	125	0	0.00	0	0.00	7	10.81	0	0.00
08/05	126	0	0.00	0	0.00	80	106.69	0	0.00
08/05	127	0	0.00	0	0.00	21	33.46	0	0.00
08/06	128	0	0.00	0	0.00	162	228.53	2	2.96
08/06	129	0	0.00	0	0.00	53	70.15	0	0.00
08/07	130	0	0.00	0	0.00	113	180.75	2	1.98
08/07	131	0	0.00	0	0.00	9	10.07	0	0.00
08/08	132	0	0.00	0	0.00	1	4.00	0	0.00
08/08	133	0	0.00	0	0.00	27	32.39	0	0.00
08/09	134	1	0.87	0	0.00	95	113.12	1	2.35

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Table 2. Test fishing catch and unadjusted mean tidal CPUE[a] by species for the 1989 Bethel test fishery (continued).

Date	Tide No.	Chinook[b]		Sockeye[c]		Coho[c]		Chum[c]	
		Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
08/09	135	0	0.00	0	0.00	26	35.51	0	0.00
08/10	136	0	0.00	0	0.00	18	26.20	0	0.00
08/11	137	0	0.00	0	0.00	65	81.67	0	0.00
08/11	138	0	0.00	0	0.00	31	40.98	0	0.00
08/12	139	0	0.00	0	0.00	33	62.66	0	0.00
08/12	140	*	0.00	*	0.00	*	11.50	*	0.00
08/13	141	0	0.00	0	0.00	5	11.50	0	0.00
08/13	142	1	2.11	0	0.00	10	16.63	0	0.00
08/14	143	0	0.00	0	0.00	10	12.64	0	0.00
08/14	144	0	0.00	0	0.00	4	7.80	0	0.00
08/15	145	0	0.00	0	0.00	1	2.11	0	0.00
08/15	146	*	0.00	*	0.00	*	1.33	*	0.00
08/16	147	0	0.00	0	0.00	1	1.33	0	0.00
08/16	148	0	0.00	0	0.00	0	0.00	0	0.00
08/17	149	0	0.00	0	0.00	4	9.14	0	0.00
08/17	150	0	0.00	0	0.00	3	2.93	0	0.00
08/18	151	0	0.00	0	0.00	1	0.98	0	0.00
08/18	152	0	0.00	0	0.00	2	4.10	0	0.00
08/19	153	0	0.00	0	0.00	1	1.90	0	0.00
08/19	154	0	0.00	0	0.00	2	4.21	0	0.00
08/20	155	1	1.74	0	0.00	6	10.43	0	0.00
08/20	156	0	0.00	0	0.00	2	2.92	0	0.00
08/21	157	0	0.00	0	0.00	22	32.70	0	0.00
08/21	158	0	0.00	0	0.00	5	9.89	0	0.00
08/22	159	0	0.00	0	0.00	6	6.15	0	0.00
08/22	160	0	0.00	0	0.00	6	10.50	0	0.00
08/23	161	0	0.00	0	0.00	9	9.67	0	0.00
08/23	162	0	0.00	0	0.00	4	6.26	0	0.00
08/24	163	0	0.00	0	0.00	3	4.45	0	0.00
08/25	164	0	0.00	0	0.00	3	7.27	0	0.00
08/25	165	0	0.00	0	0.00	10	12.52	0	0.00
08/26	166	0	0.00	0	0.00	5	4.95	0	0.00
08/26	167	*	0.00	*	0.00	*	7.81	*	0.00
08/27	168	0	0.00	0	0.00	4	7.81	0	0.00
08/27	169	*	0.00	*	0.00	*	7.32	*	0.00
08/28	170	0	0.00	0	0.00	7	6.83	0	0.00
08/28	171	0	0.00	0	0.00	3	5.06	0	0.00
08/29	172	0	0.00	0	0.00	2	4.00	0	0.00
08/29	173	*	0.00	*	0.00	*	0.95	*	0.00
08/30	174	0	0.00	0	0.00	1	0.95	0	0.00
08/30	175	0	0.00	0	0.00	0	0.00	0	0.00
08/31	176	0	0.00	0	0.00	4	6.22	0	0.00
Total		314	523.41	256	800.93	1703	2451.28	937	2609.53

[a] When catch information was missing (*) CPUE was interpolated or, when missed due to a commercial fishing period, the missing data was estimated based on the catch from the following tide.

[b] Includes fish caught in 13.6 cm (5-3/8 in) and 20.3 cm (8 in) mesh gill nets.

[c] Includes fish caught in 13.6 cm (5-3/8 in) mesh gill nets only.

Table 3. Cummulative drift CPUE by year and mesh size for chinook salmon caught in the Kuskokwim River test fishery through 10 July of each year.[a]

Year	Total[b] Drift CPUE	Gill Net Mesh Size			
		13.6 cm		20.3 cm	
		CPUE	%	CPUE	%
1984	485.07	280.13	57.75	204.94	42.25
1985	370.02	194.90	52.67	175.12	47.33
1986	326.68	227.32	69.58	99.36	30.42
1987	2081.51	1390.69	66.81	690.82	33.19
1988	1219.56	685.68	56.22	533.88	43.78
1989	1778.49	1115.86	62.74	663.43	37.30
Mean (84-88)	896.57	555.74	60.61	340.82	39.39

[a] Cummulative drift CPUE is an unweighted sum of all drift CPUE indices; it is different from the mean tidal CPUE reported in Table 2.

[b] Does not include estimated CPUE for missed drifts.

Table 4. Cummulative drift CPUE by station and species for the Kuskokwim River test fishery, 1984-1989.[a]

Species	Year	Total[b] Drift CPUE	Station I		Station II		Station III	
			CPUE	%	CPUE	%	CPUE	%
Chinook	1984	928.18	380.49	40.99	158.59	17.09	389.10	41.92
	1985	398.53	280.47	70.38	47.33	11.88	70.73	17.75
	1986	583.70	278.93	47.79	164.62	28.20	140.15	24.01
	1987	2248.75	1021.89	45.44	552.30	24.56	674.56	30.00
	1988	1343.64	808.23	60.15	185.72	13.82	349.69	26.03
	1989	1872.02	1221.22	65.24	134.95	7.21	515.85	27.56
	Mean: (84-88)	1100.58	554.00	52.95	221.71	19.11	324.85	27.94
Sockeye	1984	1260.66	705.51	55.97	308.01	24.43	247.04	19.60
	1985	3210.42	1977.80	61.61	724.44	22.57	508.18	15.83
	1986	11528.63	6353.98	55.11	2417.07	20.97	2757.58	23.92
	1987	5375.82	2285.28	42.51	1391.05	25.88	1699.49	31.61
	1988	3106.24	1968.49	63.37	683.14	21.99	454.61	14.64
	1989	1723.89	1046.68	60.72	442.20	25.65	235.02	13.63
	Mean: (84-88)	4896.35	2658.23	55.71	1104.74	23.17	1133.38	21.12
Coho	1984	8928.76	4791.52	53.66	1506.68	16.87	2630.56	29.46
	1985	4334.87	3211.52	74.09	653.60	15.08	469.75	10.84
	1986	11528.63	6353.98	55.11	2417.07	20.97	2757.58	23.92
	1987	7155.69	5043.37	70.48	530.59	7.41	1581.73	22.10
	1988	11200.31	5489.19	49.01	3897.51	34.80	1813.81	16.19
	1989	9565.81	3388.60	35.40	3388.58	35.42	2790.65	29.17
	Mean: (84-88)	8629.65	4977.92	60.47	1801.09	19.03	1850.65	20.50
Chum	1984	5048.15	2382.66	47.20	1167.13	23.12	1498.36	29.68
	1985	2784.86	2042.35	73.34	353.10	12.68	389.41	13.98
	1986	7762.30	3186.86	41.06	2791.92	35.97	1783.52	22.98
	1987	12838.91	4266.46	33.23	4259.11	33.17	4313.34	33.60
	1988	11048.54	5593.88	50.63	3320.45	30.05	2134.21	19.32
	1989	6306.83	3147.72	49.91	2077.58	32.98	1081.53	17.17
	Mean: (84-88)	7896.55	3494.44	49.09	2378.34	27.00	2023.77	23.91

[a] Cummulative drift CPUE is an unweighted sum of all drift CPUE indicies; therefore, it is different from the mean tidal CPUE reported in Table 2.

[b] Includes estimated CPUE for missed drifts.

Table 5. Daily catch composition of the 1989 Bethel test fishery and District 1 commercial fishery.

DATE	TEST FISHING (by % Mean Daily CPUE)				COMMERCIAL CATCH (by % Fish Landed)			
	Chinook	Sockeye	Coho	Chum	Chinook	Sockeye	Coho	Chum
06/01	0.00	0.00	0.00	100.00				
06/02								
06/03								
06/04								
06/05	0.00	0.00	0.00	100.00				
06/06	0.00	100.00	0.00	0.00				
06/07	22.18	0.00	0.00	77.82				
06/08	38.75	0.00	0.00	61.25				
06/09	42.86	14.29	0.00	42.86				
06/10	51.22	9.57	0.00	39.21				
06/11	25.00	25.00	25.00	25.00				
06/12	23.19	30.78	0.00	46.03				
06/13	26.57	25.77	0.00	47.66				
06/14	44.21	44.03	0.00	11.75				
06/15	23.93	30.24	0.00	45.83				
06/16	15.01	34.12	0.00	50.87				
06/17	58.12	29.68	0.00	12.21				
06/18	28.63	34.66	0.00	36.72				
06/19	15.83	28.12	0.00	56.06	16.29	9.73	0.00	73.98
06/20	20.58	23.83	0.00	55.58				
06/21	9.71	36.99	0.00	53.30				
06/22	12.90	44.35	0.00	42.75				
06/23	16.98	26.14	0.00	56.88	7.64	8.91	0.00	83.45
06/24	9.25	17.54	0.00	73.21				
06/25	8.29	26.02	0.00	65.69				
06/26	25.86	13.96	0.00	60.18	4.90	9.88	0.00	85.23
06/27	25.00	25.00	25.00	25.00				
06/28	15.81	32.90	0.00	51.49				
06/29	1.75	21.58	0.00	76.66				
06/30	13.18	23.76	0.00	63.06	6.11	6.76	0.00	87.13
07/01	8.06	9.55	0.00	82.39				
07/02	4.23	14.13	0.00	81.64				
07/03	8.61	20.47	0.00	70.92	4.52	5.71	0.00	89.77
07/04	10.33	2.19	0.00	87.48				
07/05	4.97	2.75	0.00	92.28	3.60	3.17	0.00	93.22
07/06	2.84	4.22	0.00	93.15				
07/07	6.28	9.71	0.00	84.01				
07/08	4.34	18.27	0.00	77.39	2.50	2.53	0.01	94.96
07/09	7.11	4.65	0.00	88.25				
07/10	6.02	0.00	0.00	93.98				
07/11	0.00	39.41	0.00	60.59	2.08	1.92	0.15	95.85
07/12	8.25	37.15	0.00	54.60				
07/13	0.00	6.89	3.22	89.89				
07/14	0.00	0.00	5.06	94.94	2.61	1.71	0.49	95.19
07/15	0.00	0.00	14.89	85.11				
07/16	0.00	26.86	0.00	73.14				
07/17	5.29	5.02	10.34	79.37				
07/18	6.33	4.25	9.73	79.68	2.90	1.51	7.40	88.19
07/19	4.79	6.31	0.00	88.40				
07/20	11.12	0.00	26.99	61.89				
07/21	3.84	0.00	42.76	53.40				
07/22	22.13	0.00	51.60	26.28				
07/23	0.00	0.00	33.18	66.82				
07/24	0.00	0.00	100.00	0.00				
07/25	0.00	0.00	48.50	51.40				
07/26	0.00	0.00	100.00	0.00				
07/27	0.00	0.00	100.00	0.00	1.80	0.81	48.42	48.97
07/28	0.00	0.00	100.00	0.00				
07/29	0.00	0.00	86.91	13.09				
07/30	0.00	0.00	100.00	0.00				
07/31	0.00	0.00	95.94	4.06				
08/01	0.00	0.00	97.06	2.94				
08/02	0.28	0.00	97.77	1.96				
08/03	0.00	0.00	95.73	4.27	0.17	0.03	96.29	3.52
08/04	0.00	0.00	95.05	4.95				
08/05	0.00	0.00	100.00	0.00				
08/06	0.00	0.00	99.02	0.98				

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Table 5. Daily catch composition of the 1989 Bethel test fishery and District 1 commercial fishery. (con't)

DATE	TEST FISHING (by % Mean Daily CPUE)				COMMERCIAL CATCH (by % Fish Landed)			
	Chinook	Sockeye	Coho	Chum	Chinook	Sockeye	Coho	Chum
08/07	0.00	0.00	98.97	1.03	0.10	0.03	98.70	1.17
08/08	0.00	0.00	100.00	0.00				
08/09	0.57	0.00	97.88	1.55	0.04	0.01	99.54	0.42
08/10	0.00	0.00	100.00	0.00				
08/11	0.00	0.00	100.00	0.00				
08/12	0.00	0.00	100.00	0.00	0.04	0.01	99.80	0.15
08/13	6.98	0.00	93.02	0.00				
08/14	0.00	0.00	100.00	0.00				
08/15	0.00	0.00	100.00	0.00	0.11	0.02	99.36	0.51
08/16	0.00	0.00	100.00	0.00				
08/17	0.00	0.00	100.00	0.00				
08/18	0.00	0.00	100.00	0.00	0.12	0.08	99.53	0.27
08/19	0.00	0.00	100.00	0.00				
08/20	11.53	0.00	88.47	0.00				
08/21	0.00	0.00	100.00	0.00				
08/22	0.00	0.00	100.00	0.00				
08/23	0.00	0.00	100.00	0.00	0.06	0.05	99.83	0.07
08/24	0.00	0.00	100.00	0.00				
08/25	0.00	0.00	100.00	0.00				
08/26	0.00	0.00	100.00	0.00	0.08	0.06	99.78	0.07
08/27	0.00	0.00	100.00	0.00				
08/28	0.00	0.00	100.00	0.00				
08/29	0.00	0.00	100.00	0.00	0.06	0.08	99.67	0.19
08/30	0.00	0.00	100.00	0.00				
08/31	0.00	0.00	100.00	0.00				
09/01	N.A.	N.A.	N.A.	N.A.	0.09	0.03	99.66	0.22

Table 6. Daily water temperature and clarity reading taken at the Bethel test fishing site in 1989.

Date	Water Temp. (C)		Secchi Reading (m)	
	am	pm	am	pm
06/01	-	-	-	0.20
06/02	-	-	-	0.50
06/03	-	-	0.25	0.30
06/04	-	9	0.25	0.25
06/05	9	9	0.40	0.40
06/06	9	9	0.30	0.25
06/07	9	9	0.25	0.30
06/08	9.5	10	0.20	0.35
06/09	10	9	0.30	0.30
06/10	10	9	0.40	0.30
06/11	10	-	0.40	-
06/12	9	10.5	0.25	0.40
06/13	12	11	0.60	0.50
06/14	11	12	-	0.35
06/15	-	12	-	0.40
06/16	-	12	-	0.30
06/17	-	12.5	-	0.50
06/18	12	-	0.60	-
06/19	12	-	0.60	-
06/20	12	-	0.40	-
06/21	-	-	-	-
06/22	13	-	5.50	-
06/23	13	-	-	1.00
06/24	13	-	7.50	-
06/25	12.5	-	-	-
06/26	13	-	0.20	-
06/27	13	13	-	0.50
06/28	-	13	-	0.60
06/29	14	-	-	0.60
06/30	-	-	-	-
07/01	-	16	-	0.50
07/02	14	17	0.60	0.60
07/03	-	-	-	-
07/04	17	-	0.40	-
07/05	18	18	0.30	-
07/06	18	-	0.25	-
07/07	17	17	0.25	0.50
07/08	17	-	0.40	-
07/09	15	16	0.35	0.35
07/10	15	-	0.20	-
07/12	15	15	0.20	0.20

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Table 6. Daily water temperature and clarity reading taken at the Bethel test fishing site in 1989 (con'.t).

Date	Water Temp. (C)		Secchi Reading (m)	
	am	pm	am	pm
07/13	-	15	-	0.20
07/14	-	-	-	-
07/15	-	15	-	0.20
07/16	-	15	-	0.20
07/17	14	-	0.25	-
07/18	13	-	0.30	-
07/19	13	13	0.30	0.20
07/20	12	-	0.20	-
07/21	12.5	-	0.30	-
07/22	12	13	0.30	0.30
07/23	12.5	-	0.30	-
07/24	12.5	13	0.20	0.10
07/25	13	-	0.20	-
07/26	-	13	-	0.20
07/27	-	-	-	-
07/28	-	12	-	0.20
07/29	-	14	-	0.20
07/30	-	14	-	0.30
08/01	14	14	-	0.20
08/02	14	14	0.20	0.30
08/03	14	14	0.20	0.30
08/04	14	14	0.20	0.30
08/05	13.5	-	0.20	-
08/06	13.5	-	0.30	-
08/07	14	-	-	-
08/08	14.5	-	0.30	-
08/09	14	-	0.30	-
08/10	14	-	0.30	-
08/11	-	14	-	0.30
08/12	-	-	-	-
08/13	-	13	-	0.20
08/14	-	13.5	-	0.20
08/15	13.5	13	0.20	0.20
08/16	14	14	0.20	0.10
08/17	14	14.5	0.20	0.20
08/18	14	13.5	0.20	0.20
08/19	13.5	13.5	0.20	0.15
08/20	13.5	13	0.15	0.15
08/21	13	13	0.15	0.15
08/22	13	-	0.20	-
08/23	12.5	-	0.20	-
08/24	13	-	0.25	-
08/25	-	-	-	-

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Table 6. Daily water temperature and clarity reading taken at the Bethel test fishing site in 1989 (con'.t).

Date	Water Temp. (C)		Secchi Reading (m)	
	am	pm	am	pm
08/26	-	-	-	-
08/27	-	-	-	-
08/28	-	12	-	0.30
08/29	12	-	-	-
08/30	12	12	0.30	0.35
08/31	12	-	0.30	-
Mean:	8.75	6.71	0.31	0.18

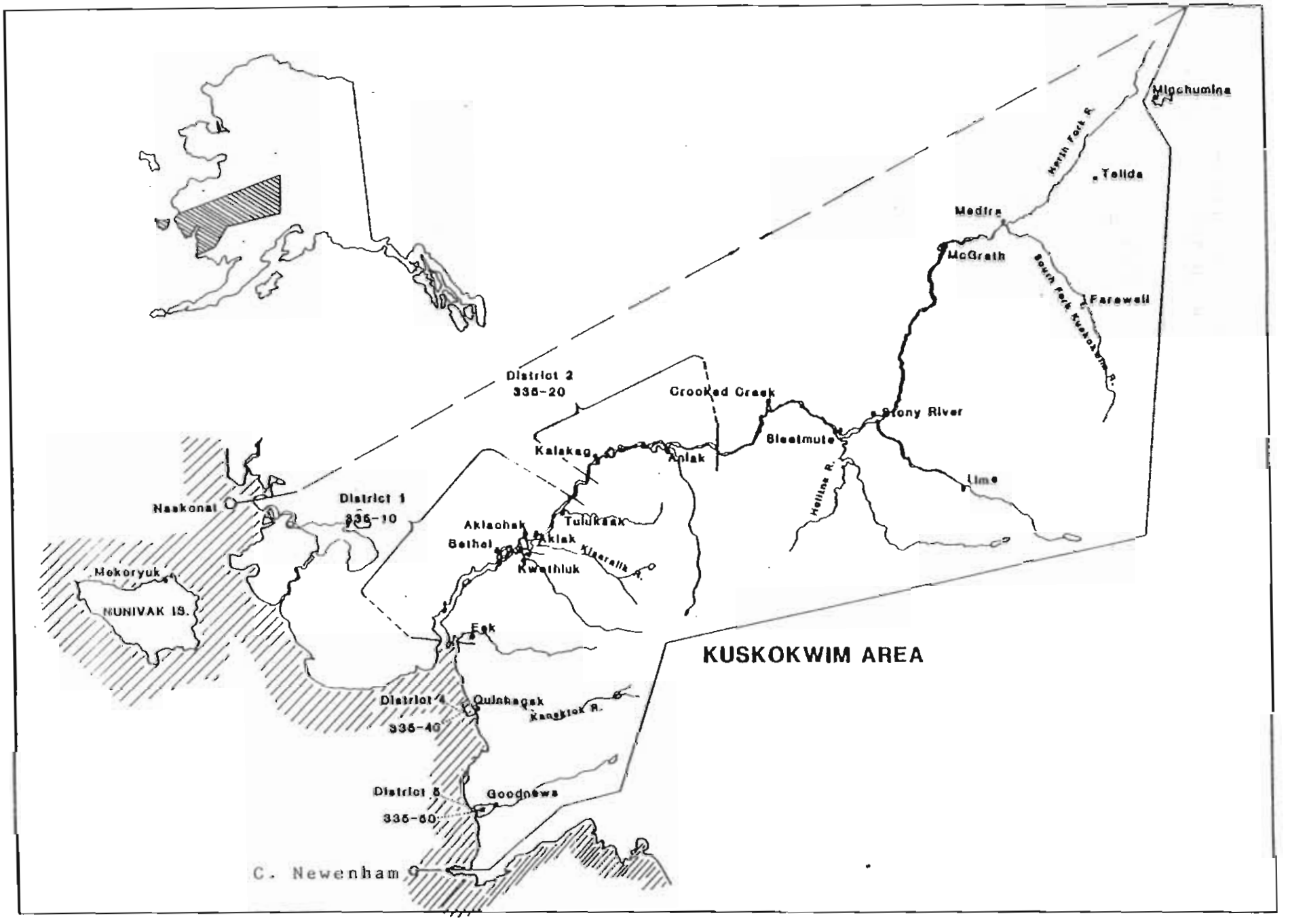

Figure 1. Map of Kuskokwim Area showing commercial fishing district boundaries.

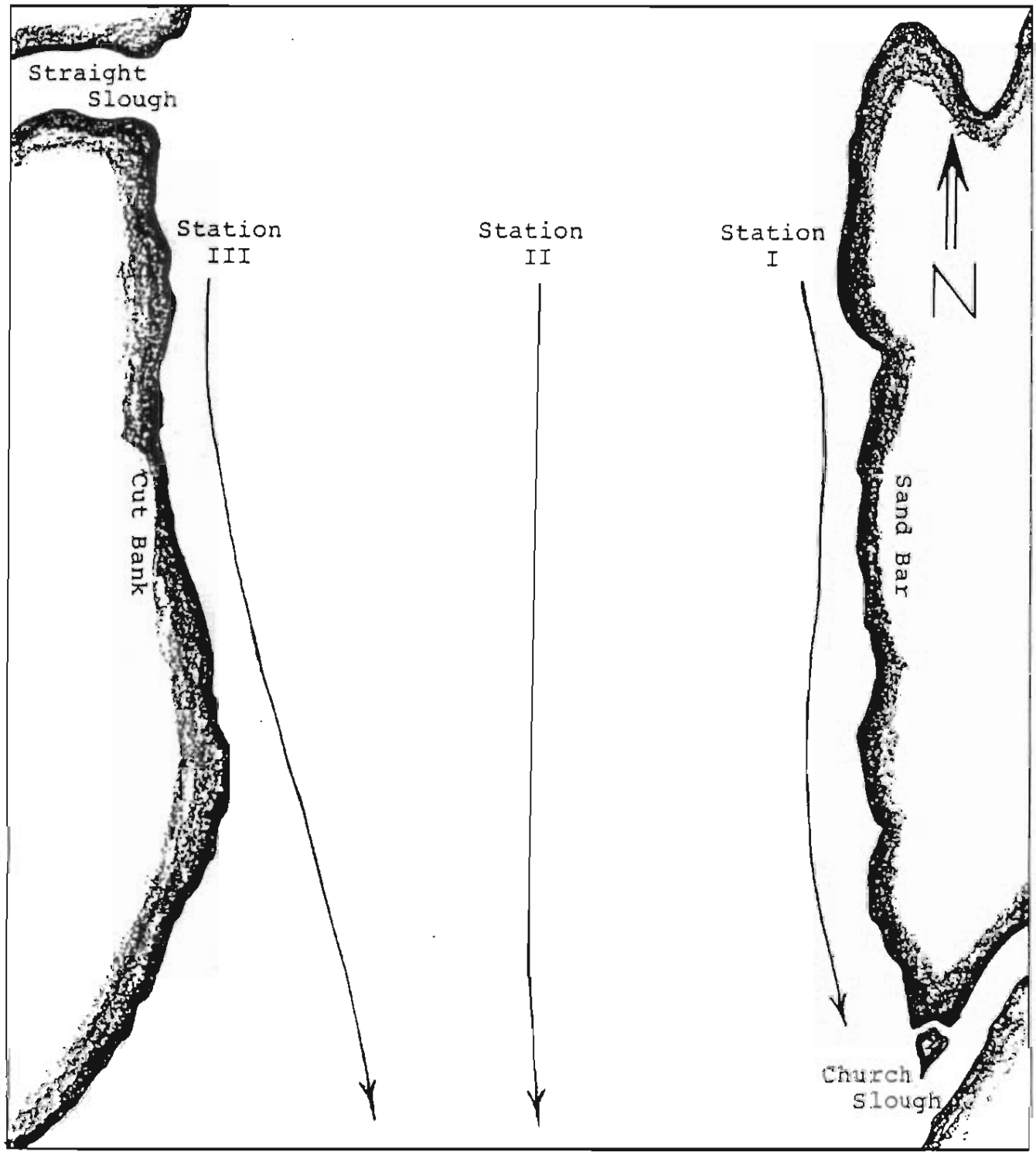

Figure 2. Approximate location of drift stations used in the 1989 Bethel test fish program (not drawn to scale).

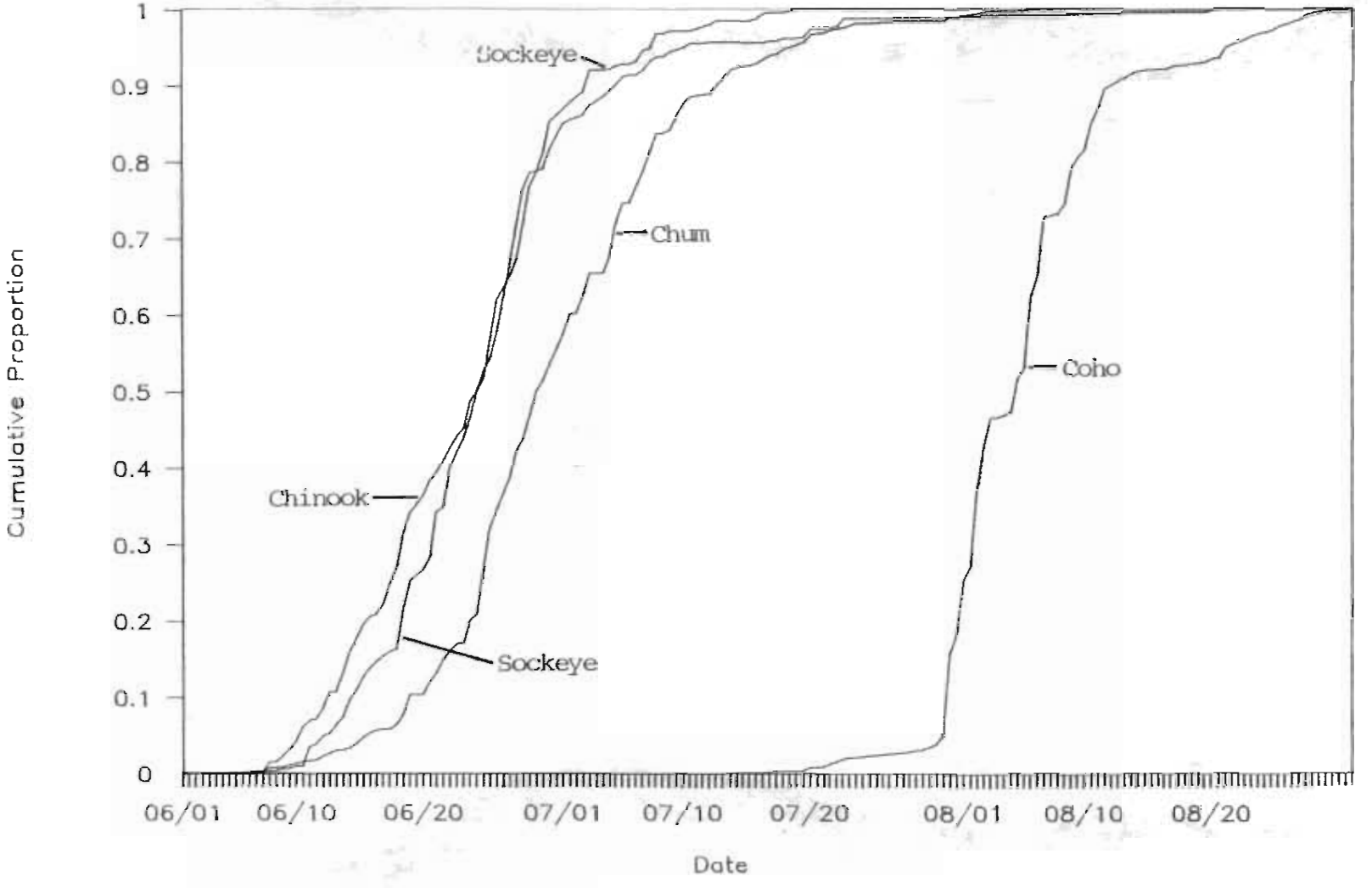

Figure 3. Cumulative proportions of mean tidal CPUE for salmon caught in the 1989 Bethel test fishery.

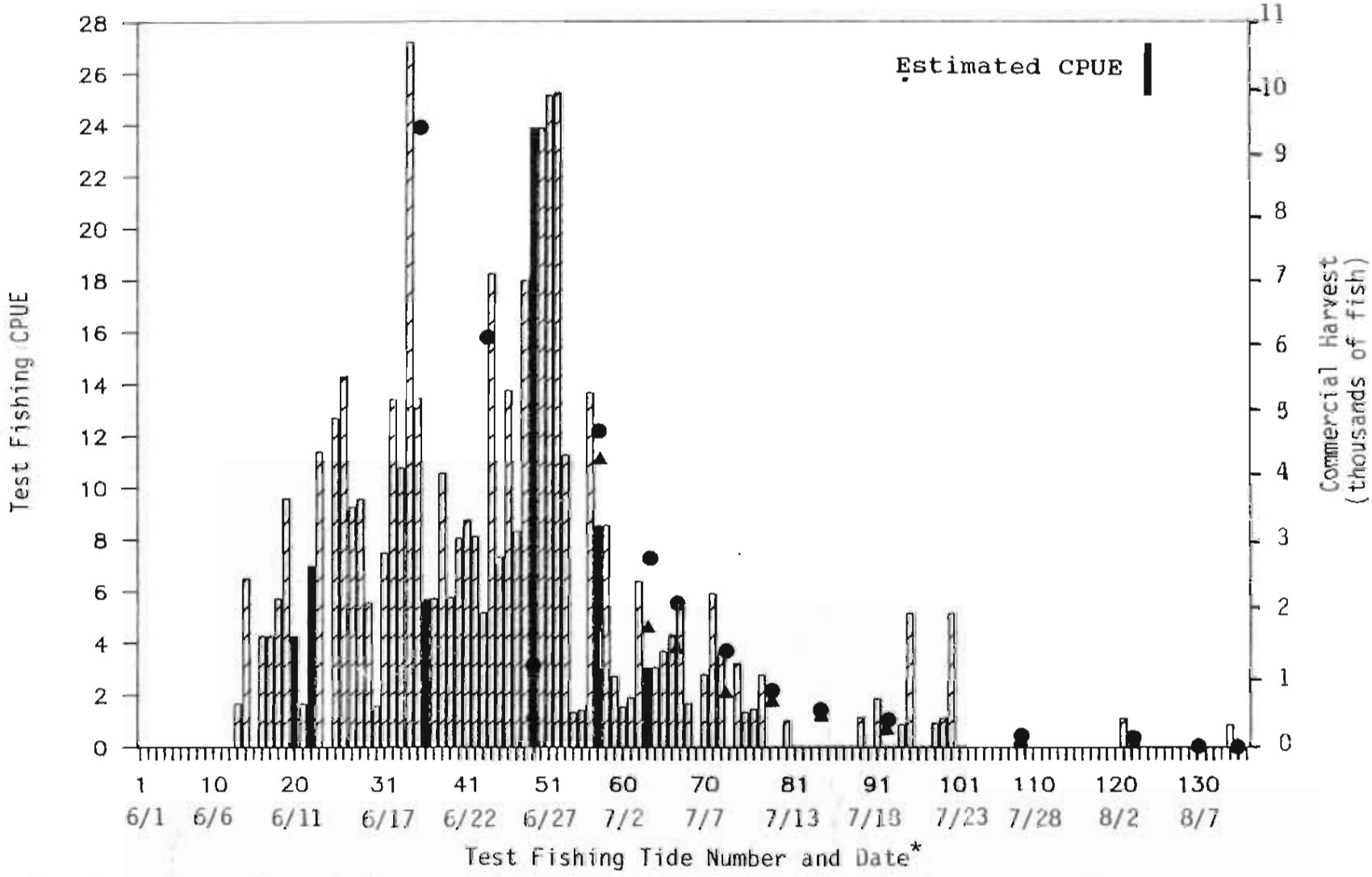

Figure 4. Comparison of the 1989 mean tidal CPUE for chinook salmon caught in the Bethel test fishery (bars) and the chinook salmon commercial harvest, by period, from statistical areas 335-11 (●) and 335-12 (▲). (* Dates and tides shown correspond to the first high tide of that day. Only one tide occurred on 6/1, 6/11, 6/28, 7/11, 7/26 and 8/10.)

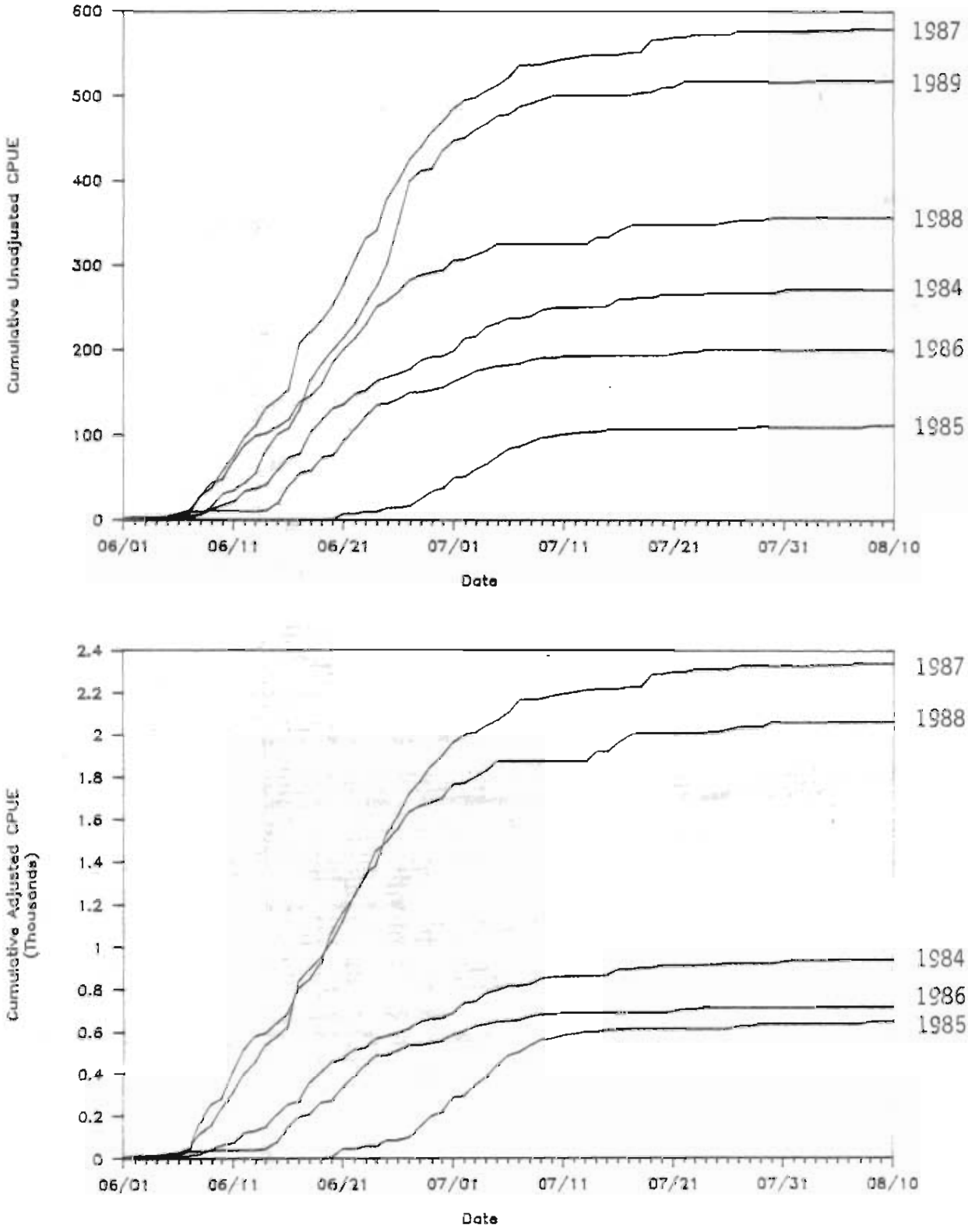

Figure 5. Cumulative unadjusted (top) and adjusted (bottom) mean tidal CPUE of chinook salmon from the 1984 - 1989 Bethel test fishery. Adjusted CPUE was not calculated in 1989 because of the violation of assumptions associated with adjustment calculation.

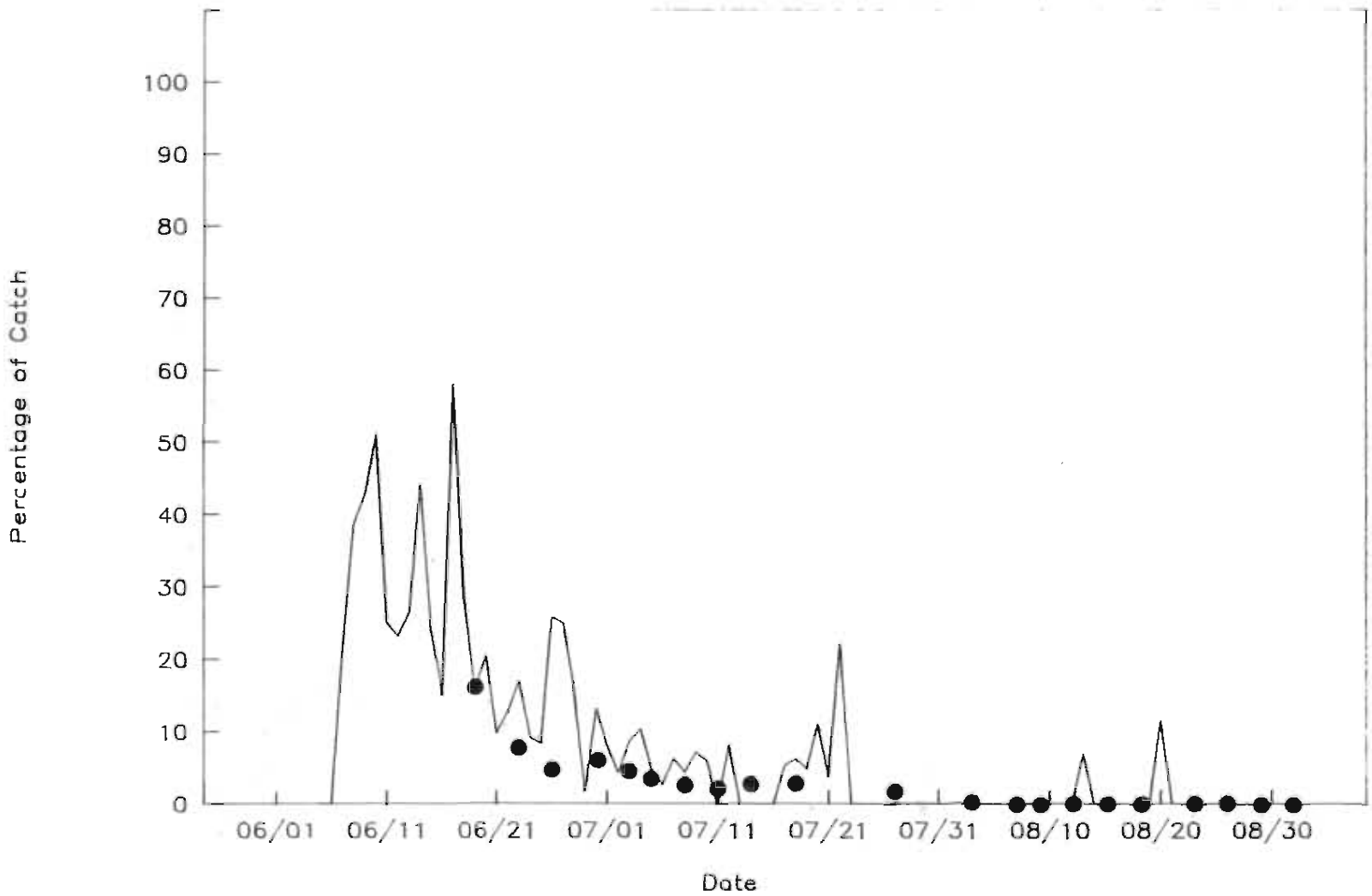

Figure 6. Proportion of chinook salmon in the daily catches from the 1989 Bethel test fishery (solid line) and District 1 commercial fishery (dots).

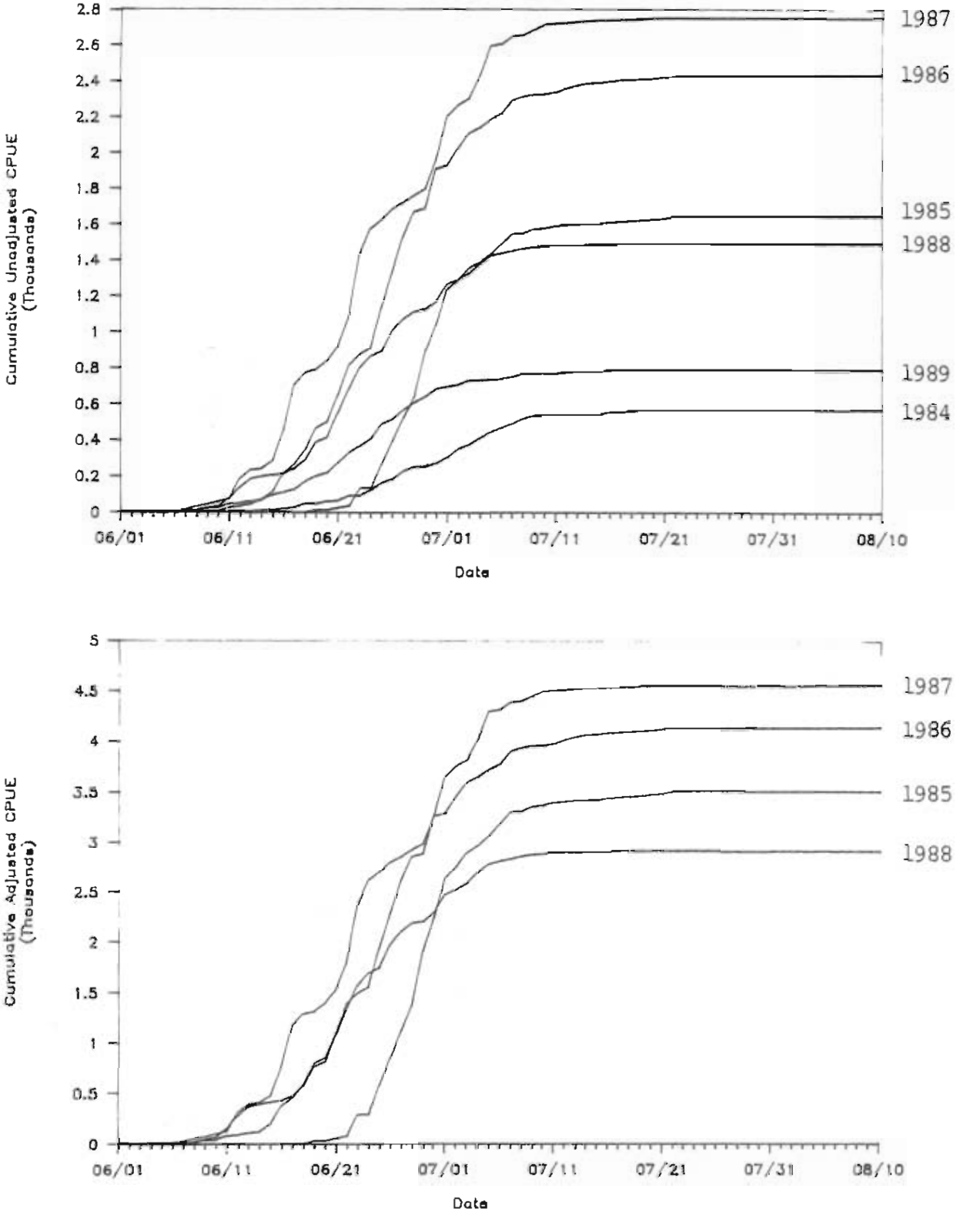

Figure 7. Cumulative unadjusted (top) and adjusted (bottom) mean tidal CPUE of sockeye salmon from the 1984 - 1989 Bethel test fishery. Adjusted CPUE's were not calculated in 1984 and 1989 because of the violations of the assumptions associated with adjusted calculation.

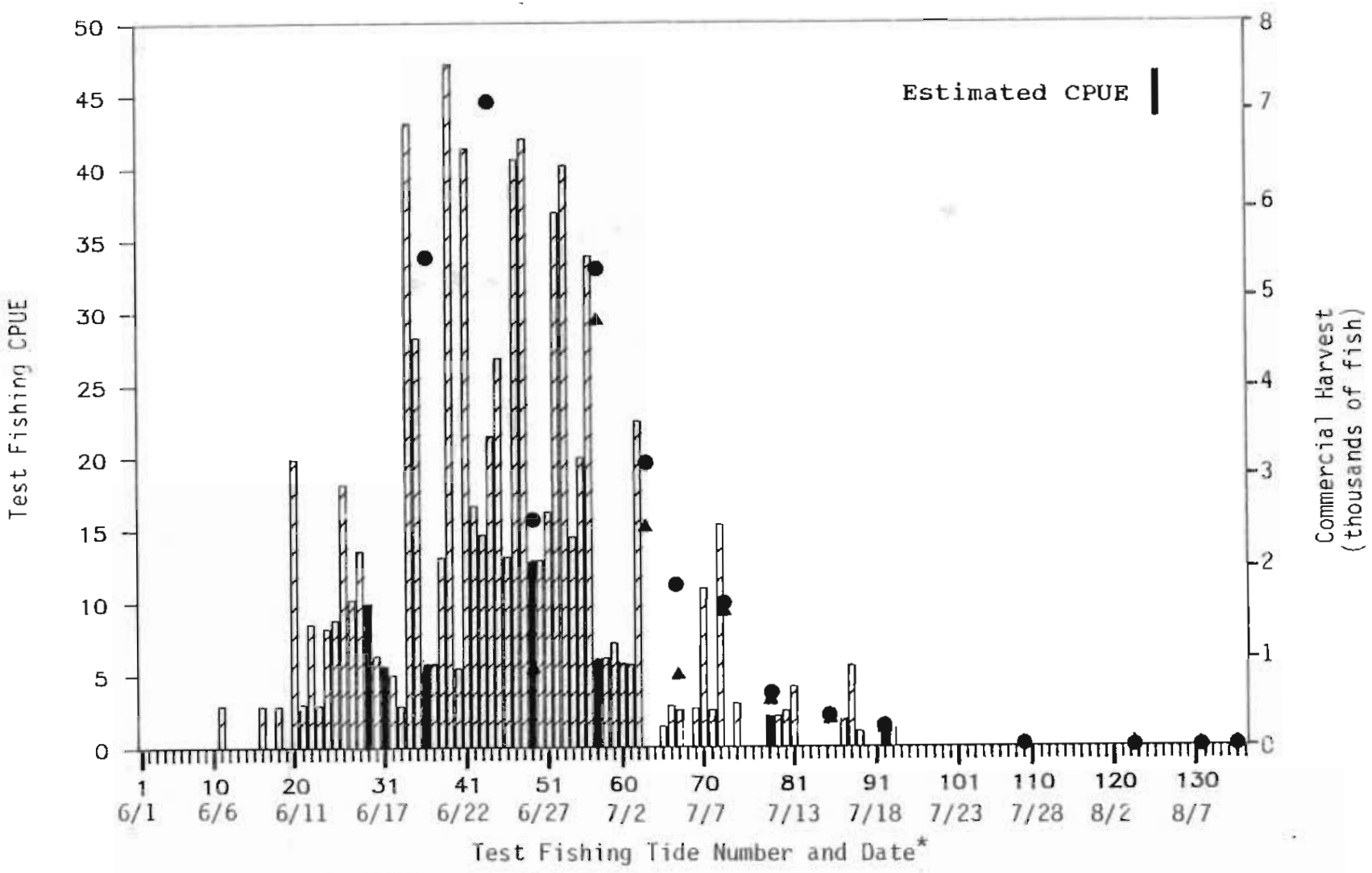

Figure 8. Comparison of the 1989 mean tidal CPUE for sockeye salmon caught in the Bethel test fishery (bars) and the sockeye salmon commercial harvest, by period, from statistical areas 335-11 (●) and 335-12 (▲). (* Dates and tides shown correspond to the first high tide of that day. Only one tide occurred on 6/1, 6/11, 6/28, 7/11, 7/26 and 8/10.)

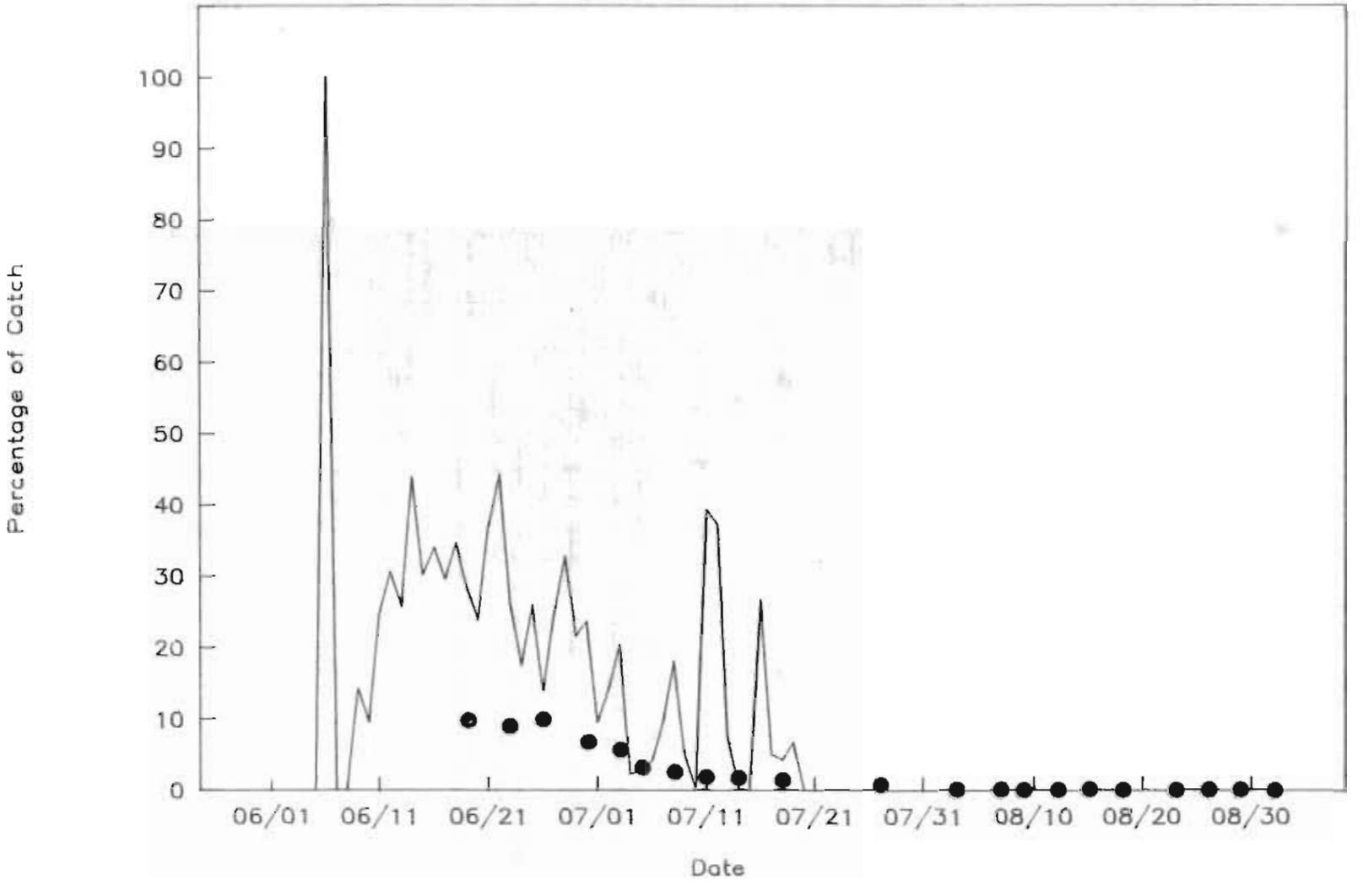

Figure 9. Proportion of sockeye salmon in the daily catches from the 1989 Bethel test fishery (solid line) and District 1 commercial fishery (dots).

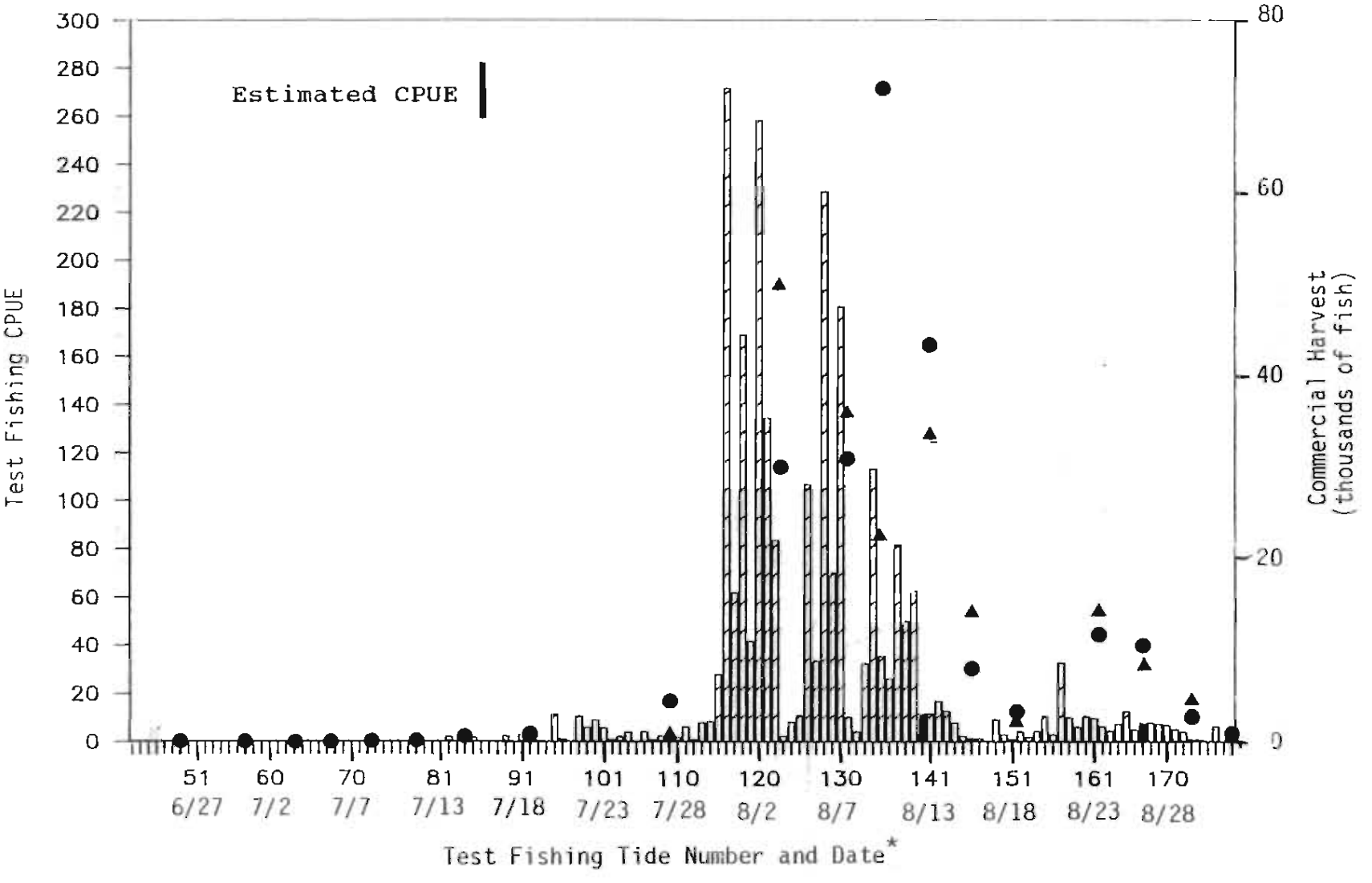

Figure 10. Comparison of the 1989 meantidal CPUE for coho salmon caught in the Bethel test fishery (bars) and the coho salmon commercial harvest, by period, from statistical areas 335-11 (●) and 335-12 (▲). (* Dates and tides shown correspond to the first high tide of that day. Only one high tide occured on 6/28, 7/11, 7/26, 8/10 and 8/24.)

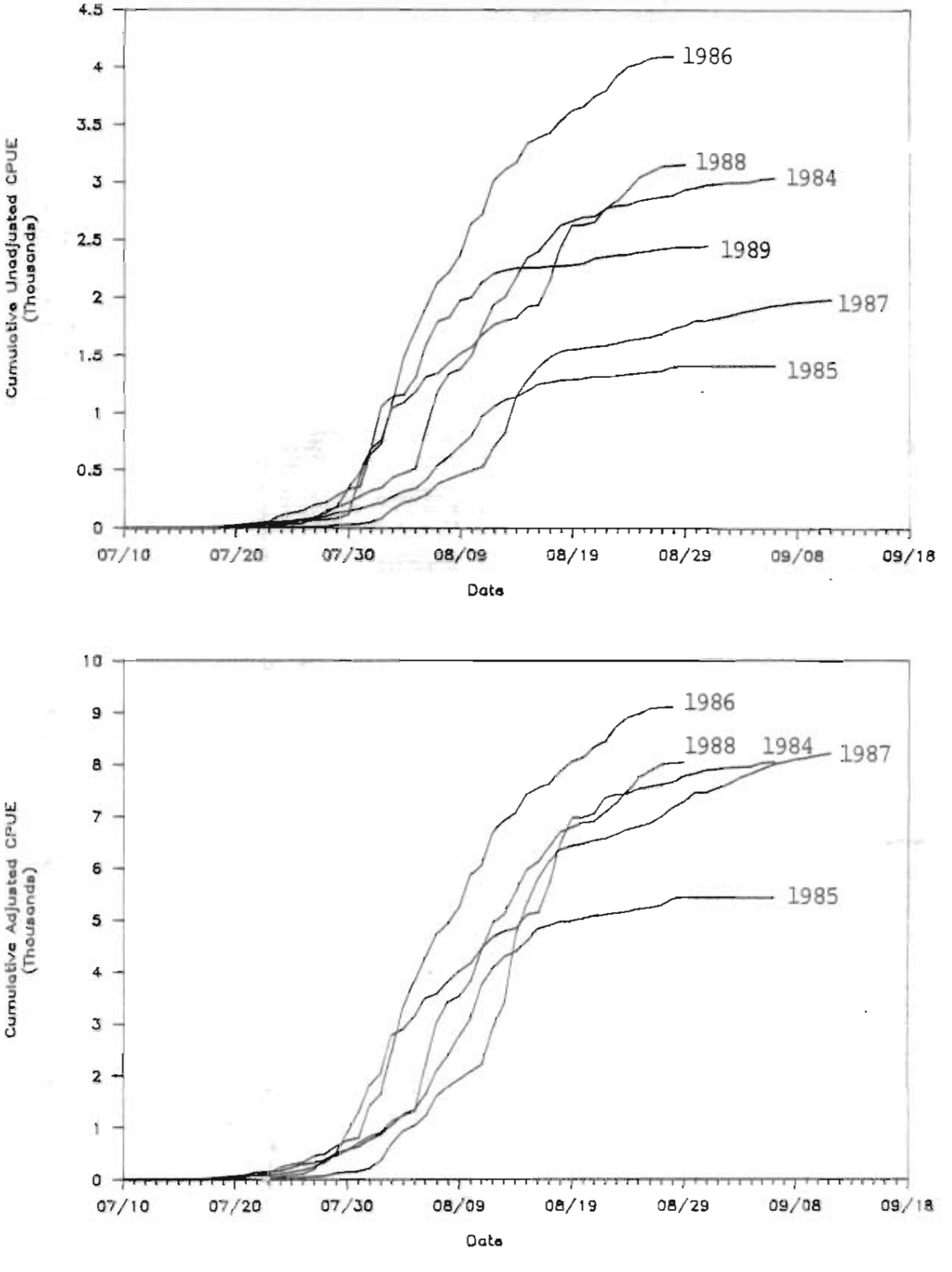

Figure 11. Cumulative unadjusted (top) and adjusted (bottom) mean tidal CPUE of coho salmon from the 1984 - 1989 Bethel test fishery. Adjusted CPUE was not calculated in 1989 because of the violation of assumptions associated with adjustment calculation.

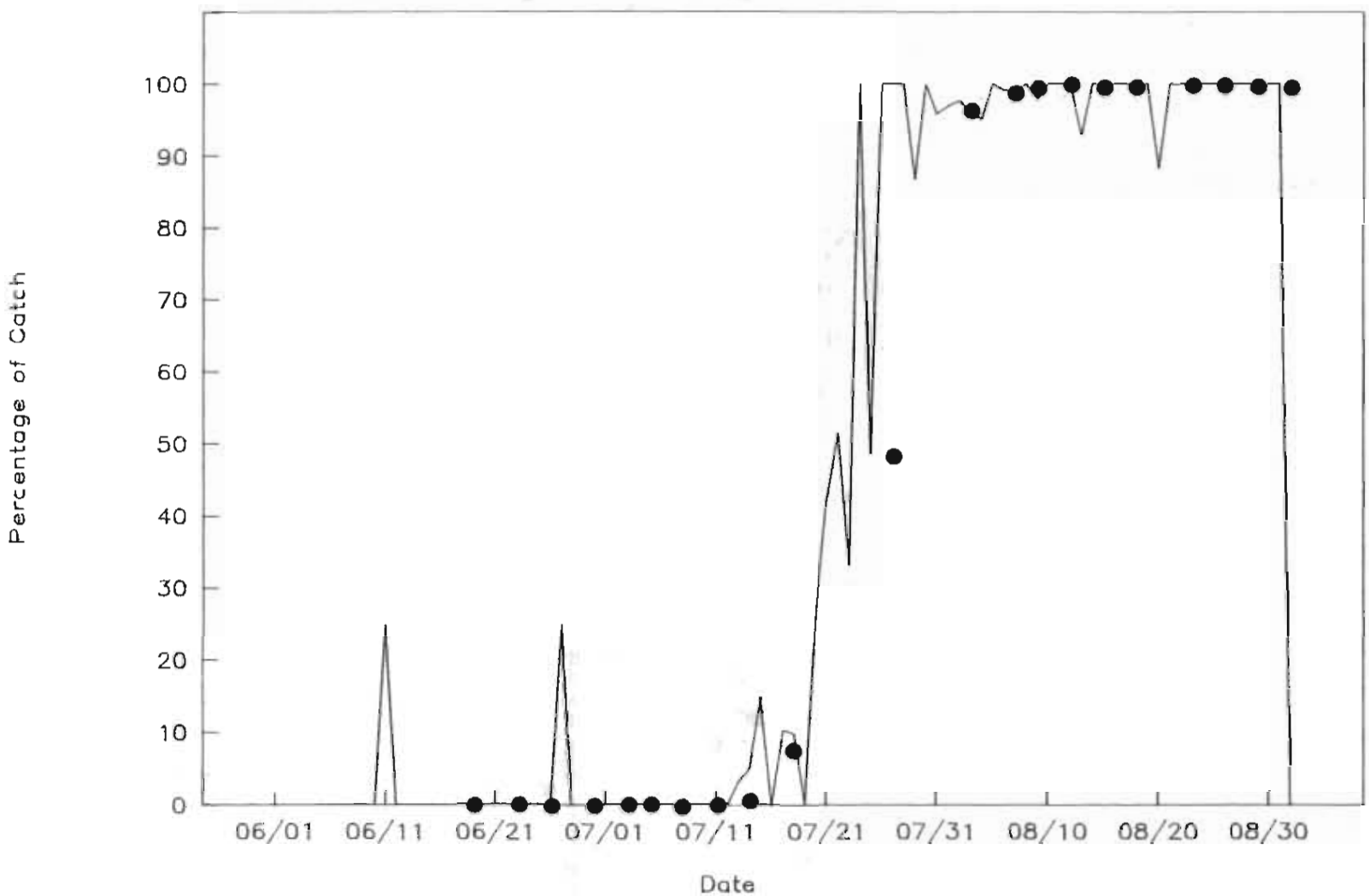

Figure 12. Proportion of coho salmon in the daily catches from the 1989 Bethel test fishery (solid line) and District 1 commercial fishery (dots).

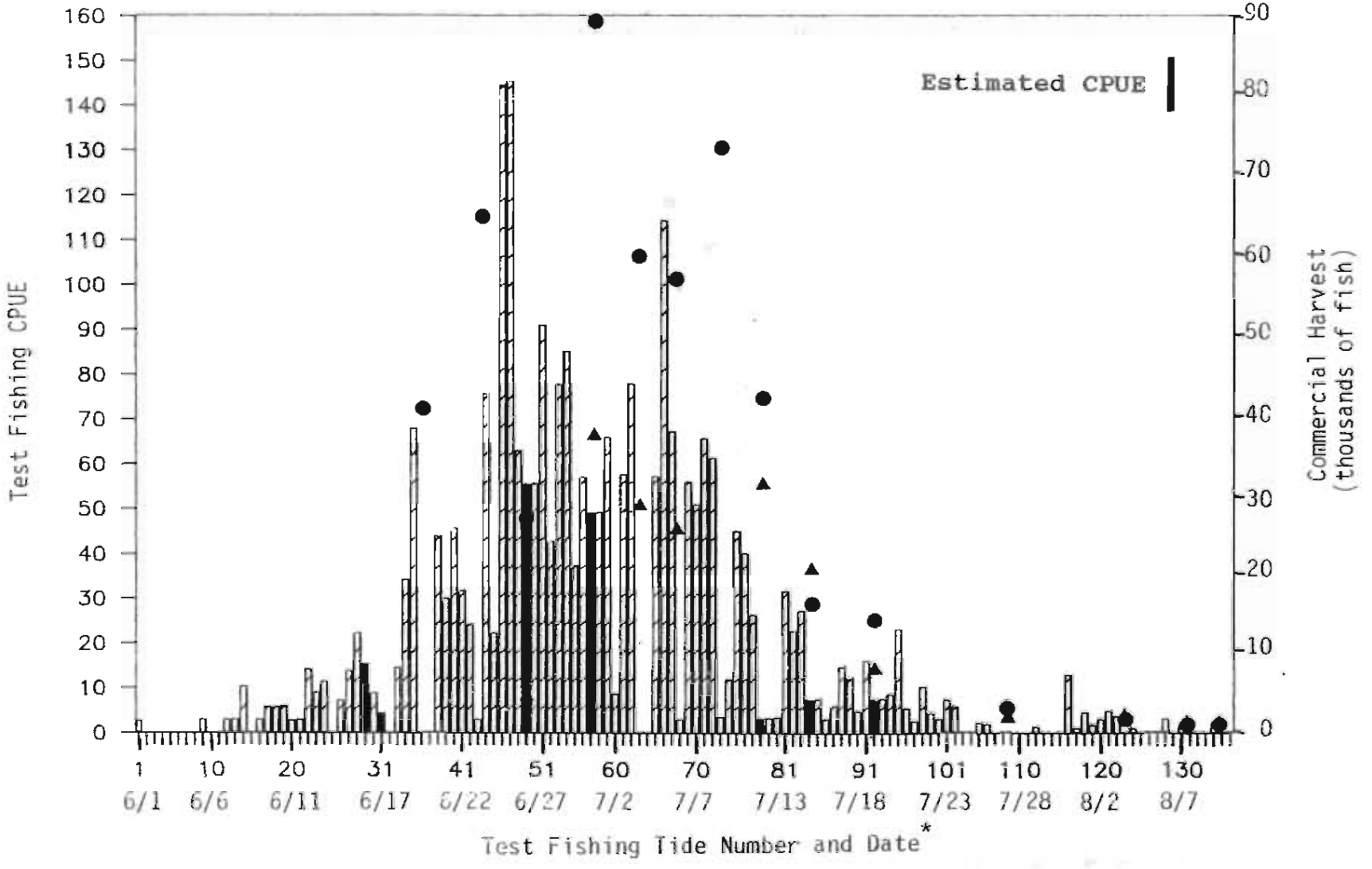

Figure 13. Comparison of the 1989 mean tidal CPUE for chum salmon caught in the Bethel test fishery (bars) and the chum salmon commercial harvest, by period, from statistical areas 335-11 (●) and 335-12 (▲). (* Dates and tides shown correspond to the first high tide of that day. Only one tide occurred on 6/1, 6/11, 6/28, 7/11, 7/26, and 8/10.)

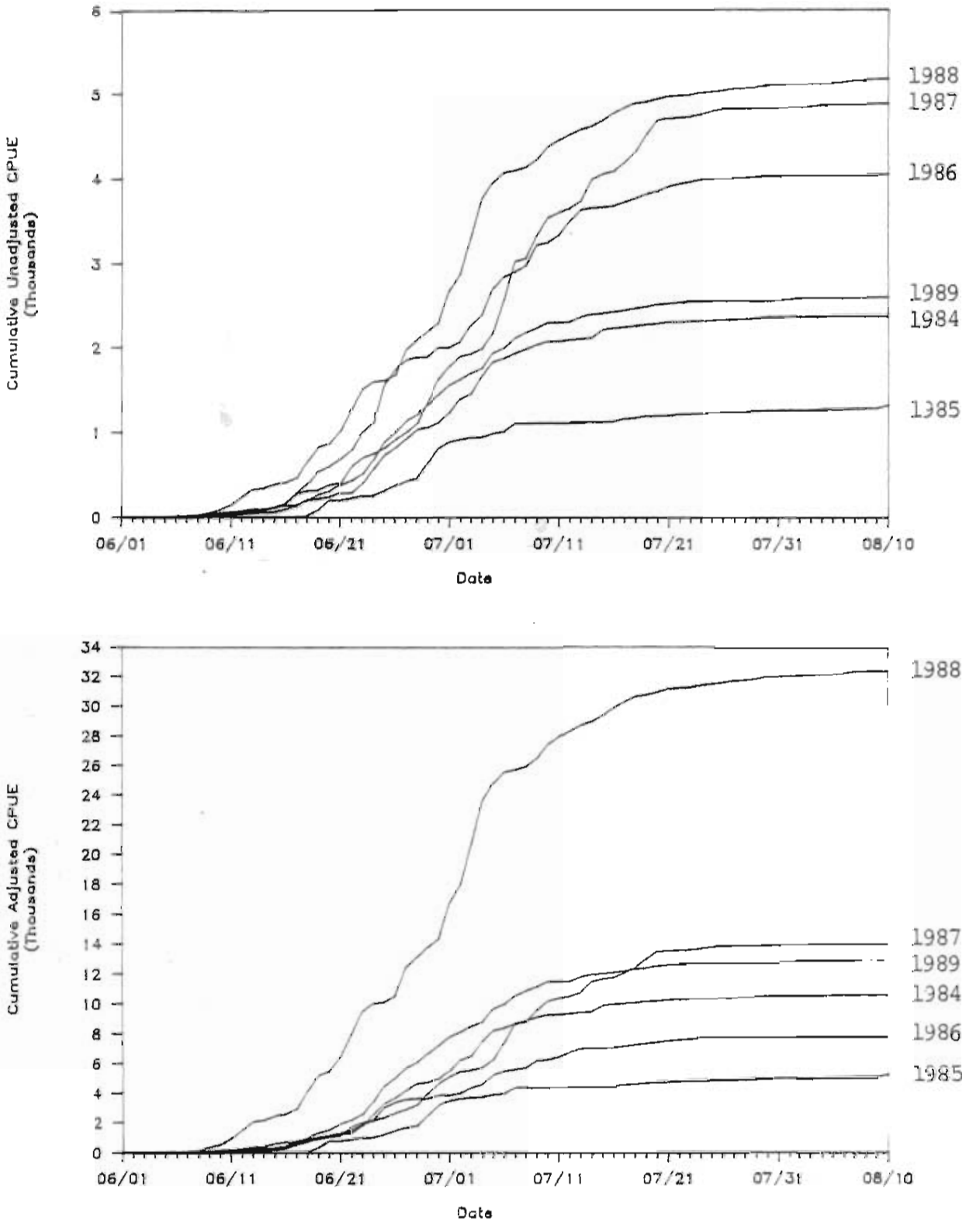

Figure 14. Cumulative unadjusted (top) and adjusted (bottom) mean tidal CPUE of chum salmon from the 1984 - 1989 Bethel test fishery.

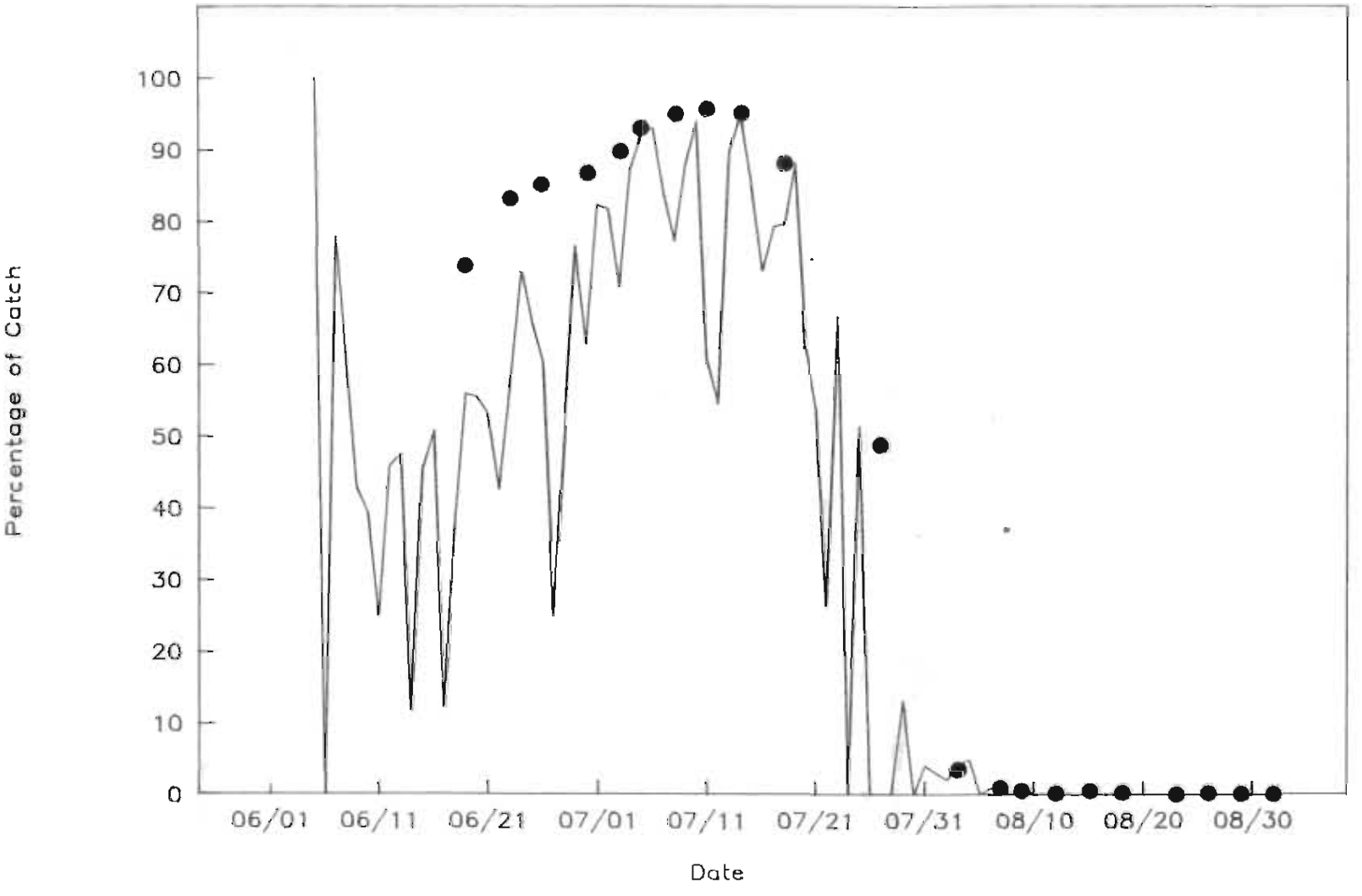

Figure 15. Proportion of chum salmon in the daily catches from the 1989 Bethel test fishery catch (solid line) and District 1 commercial fishery (dots).

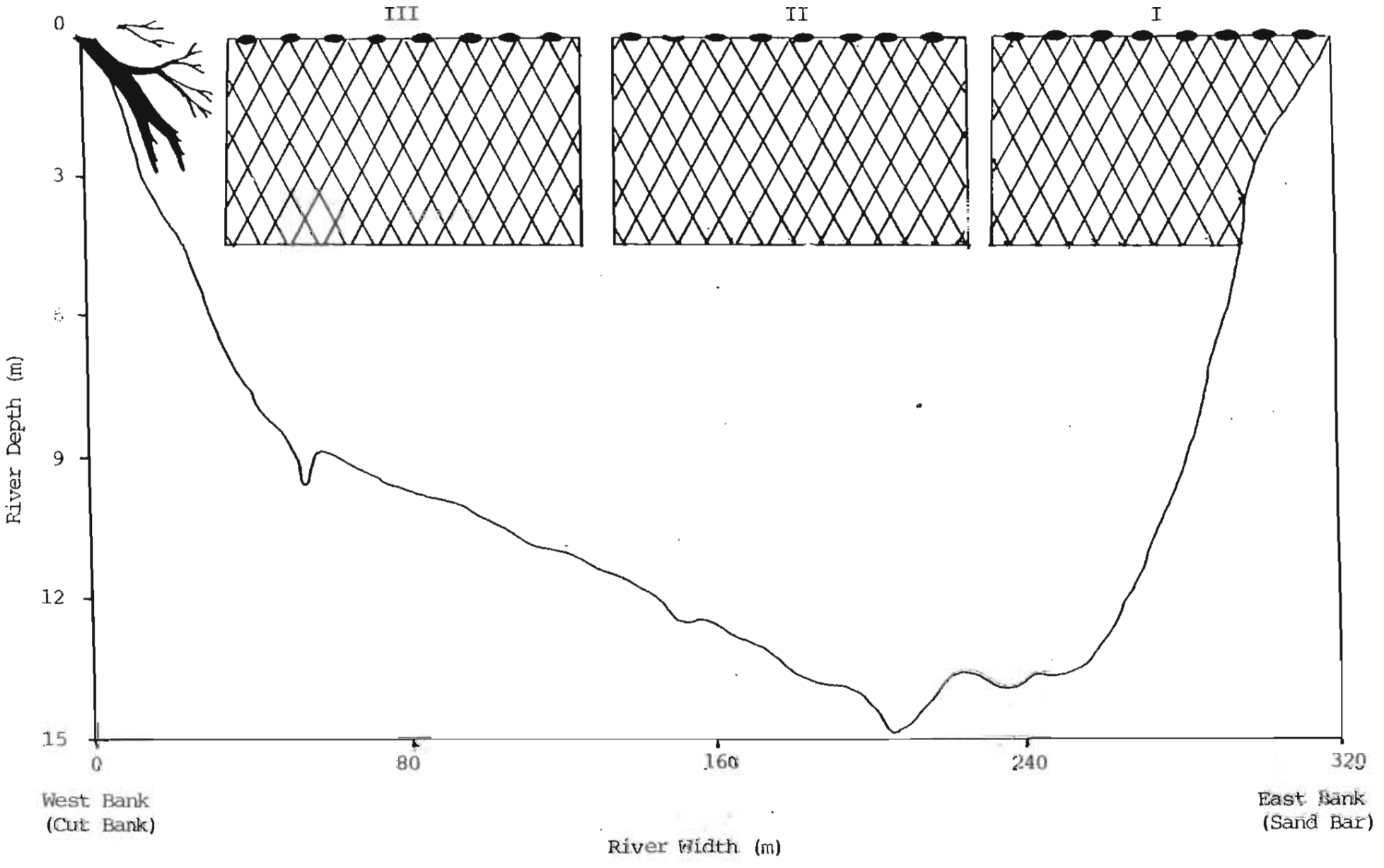

Figure 16. Profile of a cross-section of the Kuskokwim River approximately four miles upstream of Bethel as it appeared in 1988, and the area sampled by gill nets used in the Bethel test fishery (drawn to scale).

Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery.

Date	Tide No.	Drift No.	Stat. No.	Fath. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook Catch	Chinook CPUE	Sockeye Catch	Sockeye CPUE	Coho Catch	Coho CPUE	Chum Catch	Chum CPUE
06/01	1	1	3	50	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/01	1	2	2	50	20.3	24.0	0	0.00	0	0.00	0	0.00	0	0.00
06/01	1	3	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/01	1	4	1	50	13.6	23.0	0	0.00	0	0.00	0	0.00	1	5.22
06/02	2	5	3	50	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/02	2	6	3	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
06/02	2	7	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/02	2	8	1	50	20.3	22.5	0	0.00	0	0.00	0	0.00	0	0.00
06/02	3	9	3	42	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/02	3	10	2	42	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/02	3	11	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/02	3	12	1	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/03	4	13	3	42	20.3	19.5	0	0.00	0	0.00	0	0.00	0	0.00
06/03	4	14	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/03	4	15	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/03	4	16	1	42	20.3	19.0	0	0.00	0	0.00	0	0.00	0	0.00
06/03	5	17	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/03	5	18	2	42	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/03	5	19	1	42	20.3	21.5	0	0.00	0	0.00	0	0.00	0	0.00
06/03	5	20	1	50	13.6	22.0	0	0.00	0	0.00	0	0.00	0	0.00
06/04	6	21	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/04	6	22	3	42	20.3	22.0	0	0.00	0	0.00	0	0.00	0	0.00
06/04	6	23	2	42	20.3	22.0	0	0.00	0	0.00	0	0.00	0	0.00
06/04	6	24	1	50	13.6	18.5	0	0.00	0	0.00	0	0.00	0	0.00
06/04	7	25	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/04	7	26	2	50	13.6	22.0	0	0.00	0	0.00	0	0.00	0	0.00
06/04	7	27	2	42	20.3	23.0	0	0.00	0	0.00	0	0.00	1	6.21
06/04	7	28	1	42	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/05	8	29	3	42	20.3	22.0	0	0.00	0	0.00	0	0.00	0	0.00
06/05	8	30	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/05	8	31	1	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/05	8	32	1	42	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/05	9	33	3	42	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/05	9	34	2	42	20.3	20.5	0	0.00	0	0.00	0	0.00	1	6.97
06/05	9	35	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/05	9	36	1	50	13.6	20.0	0	0.00	0	0.00	0	0.00	1	6.00
06/06	10	37	3	42	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/06	10	38	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/06	10	39	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/06	10	40	1	42	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/06	11	41	3	50	13.6	20.5	0	0.00	1	5.85	0	0.00	0	0.00
06/06	11	42	2	42	20.3	20.5	0	0.00	0	0.00	0	0.00	1	6.97
06/06	11	43	1	42	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/06	11	44	1	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/07	12	45	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/07	12	46	3	42	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/07	12	47	2	42	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/07	12	48	1	50	13.6	21.0	0	0.00	0	0.00	0	0.00	1	5.71
06/07	13	49	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	1	6.00
06/07	13	50	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/07	13	51	2	50	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/07	13	52	1	50	20.3	18.0	1	6.67	0	0.00	0	0.00	0	0.00
06/08	14	53	3	50	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/08	14	54	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/08	14	55	1	50	13.6	17.5	3	20.57	0	0.00	0	0.00	3	20.57
06/08	14	56	1	50	20.3	22.0	1	5.45	0	0.00	0	0.00	0	0.00
06/08	15	57	3	50	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/08	15	58	2	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/08	15	59	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/08	15	60	1	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/09	16	61	3	50	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/09	16	62	3	50	13.6	21.0	0	0.00	1	5.71	0	0.00	1	5.71
06/09	16	63	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/09	16	64	1	50	20.3	21.0	3	17.14	0	0.00	0	0.00	0	0.00
06/09	17	65	3	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
06/09	17	66	2	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/09	17	67	1	50	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/09	17	68	1	50	13.6	21.0	3	17.14	0	0.00	0	0.00	2	11.43
06/10	18	69	3	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/10	18	70	3	50	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00

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Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery (con't).

Date	Tide No.	Drift No.	Stat. No.	Path. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook Catch	Chinook CPUE	Sockeye Catch	Sockeye CPUE	Coho Catch	Coho CPUE	Chum Catch	Chum CPUE
06/10	18	71	2	50	20.3	21.5	0	0.00	0	0.00	0	0.00	0	0.00
06/10	18	72	1	50	13.6	21.0	4	22.86	1	5.71	0	0.00	2	11.43
06/10	19	73	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	2	12.00
06/10	19	74	2	50	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/10	19	75	2	50	20.3	19.0	1	6.32	0	0.00	0	0.00	0	0.00
06/10	19	76	1	50	13.6	15.0	4	32.00	0	0.00	0	0.00	0	0.00
06/11	20	77	3	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/11	20	78	2	50	13.6	22.0	0	0.00	1	5.45	0	0.00	1	5.45
06/11	20	79	1	50	13.6	14.0	2	17.14	4	34.29	0	0.00	0	0.00
06/11	20	80	1	50	20.3	16.0	0	0.00	0	0.00	0	0.00	0	0.00
06/12	21	81	3	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/12	21	82	2	50	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/12	21	83	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	1	6.00
06/12	21	84	1	50	13.6	18.0	1	6.67	1	6.67	0	0.00	0	0.00
06/12	22	85	3	50	20.3	20.0	0	0.00	1	6.00	0	0.00	0	0.00
06/12	22	86	3	50	13.6	21.5	2	11.16	1	5.58	0	0.00	1	5.58
06/12	22	87	2	50	13.6	21.0	0	0.00	2	11.43	0	0.00	4	22.86
06/12	22	88	1	50	20.3	21.5	3	16.74	0	0.00	0	0.00	1	5.58
06/13	23	89	3	50	13.6	20.5	0	0.00	1	5.85	0	0.00	2	11.71
06/13	23	90	2	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/13	23	91	1	50	20.3	22.5	5	26.67	0	0.00	0	0.00	2	10.67
06/13	23	92	1	50	13.6	19.0	3	18.95	0	0.00	0	0.00	1	6.32
06/13	24	93	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	2	12.00
06/13	24	94	3	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/13	24	95	2	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/13	24	96	1	50	13.6	22.0	0	0.00	3	16.36	0	0.00	2	10.91
06/14	25	97	3	50	13.6	21.0	4	22.86	2	11.43	0	0.00	0	0.00
06/14	25	98	2	50	13.6	19.5	0	0.00	1	6.15	0	0.00	0	0.00
06/14	25	99	2	50	20.3	18.5	0	0.00	0	0.00	0	0.00	0	0.00
06/14	25	100	1	50	20.3	21.5	5	27.91	1	5.58	0	0.00	0	0.00
06/14	26	101	3	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/14	26	102	2	50	13.6	17.5	0	0.00	2	13.71	0	0.00	1	6.86
06/14	26	103	1	50	13.6	16.0	4	30.00	3	22.50	0	0.00	1	7.50
06/14	26	104	1	50	20.3	22.0	5	27.27	0	0.00	0	0.00	1	5.45
06/15	27	105	3	50	20.3	19.5	0	0.00	0	0.00	0	0.00	0	0.00
06/15	27	106	2	50	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
06/15	27	107	2	50	13.6	21.5	0	0.00	2	11.16	0	0.00	0	0.00
06/15	27	108	1	50	13.6	13.0	4	36.92	1	9.23	0	0.00	3	27.69
06/15	28	109	3	50	20.3	21.0	2	11.43	0	0.00	0	0.00	0	0.00
06/15	28	110	3	50	13.6	22.5	4	21.33	4	21.33	0	0.00	4	21.33
06/15	28	111	2	50	13.6	21.0	0	0.00	1	5.71	0	0.00	4	22.86
06/15	28	112	1	50	20.3	22.0	1	5.45	0	0.00	0	0.00	0	0.00
06/16	29													
06/16	29	missed tide												
06/16	29													
06/16	29													
06/16	30	113	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	3	17.56
06/16	30	114	2	50	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/16	30	115	1	50	20.3	19.0	0	0.00	0	0.00	0	0.00	1	6.32
06/16	30	116	1	50	13.6	19.0	1	6.32	2	12.63	0	0.00	0	0.00
06/17	31													
06/17	31	missed tide												
06/17	31													
06/17	31													
06/17	32	117	1	50	13.6	24.0	4	20.00	2	10.00	0	0.00	0	0.00
06/17	32	118	2	50	20.3	18.5	0	0.00	0	0.00	0	0.00	0	0.00
06/17	32	119	3	50	20.3	19.0	1	6.32	0	0.00	0	0.00	0	0.00
06/17	32	120	3	50	13.6	22.0	5	27.27	0	0.00	0	0.00	0	0.00
06/18	33	121	3	50	13.6	21.0	1	5.71	1	5.71	0	0.00	4	22.86
06/18	33	122	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	1	6.00
06/18	33	123	2	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/18	33	124	1	50	20.3	22.5	7	37.33	4	21.33	0	0.00	2	10.67
06/18	34	125	1	50	20.3	21.0	2	11.43	0	0.00	0	0.00	0	0.00
06/18	34	126	1	50	13.6	24.0	15	75.00	15	75.00	0	0.00	7	35.00
06/18	34	127	2	50	13.6	21.5	4	22.33	2	11.16	0	0.00	6	33.49
06/18	34	128	3	50	20.3	19.5	0	0.00	0	0.00	0	0.00	0	0.00
06/19	35	129	3	50	20.3	19.5	2	12.31	0	0.00	0	0.00	0	0.00
06/19	35	130	2	50	20.3	19.5	0	0.00	0	0.00	0	0.00	0	0.00
06/19	35	131	2	50	13.6	19.5	1	6.15	0	0.00	0	0.00	6	36.92
06/19	35	132	1	50	13.6	17.0	5	35.29	8	56.47	0	0.00	14	98.82

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Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery (con't).

Date	Tide No.	Drift No.	Stat. No.	Fath. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook Catch	Chinook CPUE	Sockeye Catch	Sockeye CPUE	Coho Catch	Coho CPUE	Chum Catch	Chum CPUE
06/19	36													
06/19	36	tide missed due to commercial fishing period												
06/19	36													
06/19	36													
06/20	37	133	1	50	20.3	21.5	2	11.16	1	5.58	0	0.00	2	11.16
06/20	37	134	2	50	13.6	21.5	0	0.00	2	11.16	0	0.00	0	0.00
06/20	37	135	3	50	20.3	21.0	1	5.71	0	0.00	0	0.00	1	5.71
06/20	37	136	3	50	13.6	20.5	1	5.85	0	0.00	0	0.00	0	0.00
06/20	38	137	3	50	13.6	21.0	1	5.71	0	0.00	0	0.00	9	51.43
06/20	38	138	2	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
06/20	38	139	1	50	20.3	19.0	0	0.00	0	0.00	0	0.00	2	12.63
06/20	38	140	1	50	13.6	23.0	7	36.52	5	26.09	0	0.00	7	36.52
06/21	39	141	3	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
06/21	39	142	3	50	20.3	20.5	1	5.85	0	0.00	0	0.00	0	0.00
06/21	39	143	2	50	20.3	19.5	0	0.00	0	0.00	0	0.00	1	6.15
06/21	39	144	1	50	13.6	28.0	4	17.14	22	94.29	0	0.00	14	60.00
06/21	40	145	3	50	13.6	22.5	4	21.33	0	0.00	0	0.00	10	53.33
06/21	40	146	2	50	13.6	22.0	2	10.91	2	10.91	0	0.00	7	38.18
06/21	40	147	2	50	20.3	19.0	0	0.00	0	0.00	0	0.00	0	0.00
06/21	40	148	1	50	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/22	41	149	1	50	20.3	23.5	0	0.00	0	0.00	0	0.00	0	0.00
06/22	41	150	1	50	13.6	25.0	6	28.80	16	76.80	0	0.00	12	57.60
06/22	41	151	2	50	13.6	20.5	0	0.00	1	5.85	0	0.00	1	5.85
06/22	41	152	3	50	20.3	19.5	1	6.15	1	6.15	0	0.00	0	0.00
06/22	42	153	3	50	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/22	42	154	2	50	20.3	21.0	1	5.71	0	0.00	0	0.00	1	5.71
06/22	42	155	2	50	13.6	21.5	0	0.00	5	27.91	0	0.00	1	5.58
06/22	42	156	1	50	13.6	22.5	5	26.67	1	5.33	0	0.00	8	42.67
06/23	43	157	3	50	20.3	21.0	1	5.71	0	0.00	0	0.00	1	5.71
06/23	43	158	3	50	13.6	20.5	0	0.00	2	11.71	0	0.00	1	5.85
06/23	43	159	2	50	13.6	20.5	0	0.00	3	17.56	0	0.00	0	0.00
06/23	43	160	1	50	20.3	16.0	2	15.00	0	0.00	0	0.00	1	7.50
06/23	44	161	3	50	13.6	20.0	3	18.00	1	6.00	0	0.00	17	102.00
06/23	44	162	2	50	20.3	20.0	2	12.00	0	0.00	0	0.00	2	12.00
06/23	44	163	1	50	20.3	20.0	0	0.00	0	0.00	0	0.00	2	12.00
06/23	44	164	1	50	13.6	19.5	7	43.08	6	36.92	0	0.00	8	49.23
06/24	45	165	3	50	13.6	21.0	1	5.71	1	5.71	0	0.00	3	17.14
06/24	45	166	3	50	20.3	21.5	3	16.74	0	0.00	0	0.00	1	5.58
06/24	45	167	2	50	20.3	21.5	0	0.00	0	0.00	0	0.00	1	5.58
06/24	45	168	1	50	13.6	17.5	1	8.86	7	48.00	0	0.00	4	27.43
06/24	46	169	3	50	13.6	24.5	9	44.08	1	4.90	0	0.00	22	107.76
06/24	46	170	2	50	13.6	22.5	0	0.00	4	21.33	0	0.00	34	181.33
06/24	46	171	2	50	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
06/24	46	172	1	50	20.3	22.0	2	10.91	4	21.82	0	0.00	5	27.27
06/25	47	173	3	50	20.3	21.0	2	11.43	0	0.00	0	0.00	1	5.71
06/25	47	174	2	50	13.6	23.0	0	0.00	3	15.65	0	0.00	16	83.48
06/25	47	175	1	50	13.6	22.0	4	21.82	12	65.45	0	0.00	38	207.27
06/25	47	176	1	50	20.3	13.0	0	0.00	0	0.00	0	0.00	0	0.00
06/25	48	177	3	50	20.3	22.5	3	16.00	0	0.00	0	0.00	0	0.00
06/25	48	178	2	50	20.3	18.5	1	6.49	2	12.97	0	0.00	0	0.00
06/25	48	179	2	50	13.6	20.0	2	12.00	9	54.00	0	0.00	11	66.00
06/25	48	180	1	50	13.6	16.0	5	37.50	4	30.00	0	0.00	8	60.00
06/26	49													
06/26	49	tide missed due to commercial fishing period												
06/26	49													
06/26	49													
06/26	50	181	3	50	20.3	21.5	2	11.16	2	11.16	0	0.00	8	0.40
06/26	50	182	3	50	13.6	22.5	5	26.67	3	16.00	0	0.00	8	42.67
06/26	50	183	2	50	13.6	24.5	2	9.80	2	9.80	0	0.00	14	68.57
06/26	50	184	1	50	20.3	22.5	9	48.00	1	5.33	0	0.00	0	0.00
06/27	51	185	3	50	13.6	15.5	3	23.23	3	23.23	0	0.00	8	61.94
06/27	51	186	1	50	13.6	26.0	3	13.85	2	9.23	0	0.00	28	120.00
06/27	51	187	1	50	20.3	17.0	8	53.53	1	7.06	0	0.00	2	14.12
06/27	51	188	1	50	20.3	21.0	0	0.00	0	0.00	0	0.00	1	5.71
06/28	52	189	3	50	13.6	21.5	4	22.33	2	11.16	0	0.00	6	33.49
06/28	51	190	3	50	20.3	21.0	1	5.71	0	0.00	0	0.00	0	0.00
06/28	52	191	1	50	20.3	16.0	0	0.00	1	7.50	0	0.00	0	0.00
06/28	51	192	1	50	13.6	11.5	7	73.04	6	62.61	0	0.00	5	52.17
06/28	51	193	3	50	13.6	23.0	5	26.09	6	31.30	0	0.00	11	57.39
06/28	51	194	2	50	13.6	24.5	0	0.00	10	48.98	0	0.00	20	97.96

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Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery (con't).

Date	Tide No.	Drift No.	Stat. No.	Path. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook Catch	Chinook CPUE	Sockeye Catch	Sockeye CPUE	Coho Catch	Coho CPUE	Chum Catch	Chum CPUE
06/28	53	195	2	50	20.3	21.0	0	0.00	1	5.71	0	0.00	2	11.43
06/28	53	196	1	50	20.3	19.0	3	18.95	1	6.32	0	0.00	0	0.00
06/29	54	197	3	50	20.3	18.5	0	0.00	1	6.49	0	0.00	3	19.46
06/29	54	198	2	50	13.6	22.0	1	5.45	3	16.36	0	0.00	15	81.82
06/29	54	199	1	50	13.6	19.0	0	0.00	2	12.63	0	0.00	14	88.42
06/29	54	200	1	50	20.3	13.5	0	0.00	0	0.00	0	0.00	0	0.00
06/29	55	201	3	50	20.3	21.0	0	0.00	0	0.00	0	0.00	1	5.71
06/29	55	202	2	50	20.3	20.0	0	0.00	0	0.00	0	0.00	1	6.00
06/29	55	203	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	3	17.56
06/29	55	204	1	50	13.6	21.0	1	5.71	7	40.00	0	0.00	10	57.14
06/30	56	205	3	50	20.3	19.5	0	0.00	0	0.00	0	0.00	0	0.00
06/30	56	206	3	50	13.6	18.5	1	6.49	1	6.49	0	0.00	5	32.43
06/30	56	207	2	50	13.6	23.5	1	5.11	12	61.28	0	0.00	16	81.70
06/30	56	208	1	50	20.3	19.5	7	43.08	2	12.31	0	0.00	3	18.46
06/30	57													
06/30	57	tide missed due to commercial fishing period												
06/30	57													
06/30	57													
07/01	58	209	3	50	13.6	21.0	1	5.71	0	0.00	0	0.00	0	0.00
07/01	58	210	2	50	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
07/01	58	211	1	50	20.3	12.0	1	10.00	0	0.00	0	0.00	0	0.00
07/01	58	212	1	50	13.6	19.5	3	18.46	2	12.31	0	0.00	16	98.46
07/01	59	213	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	2	12.00
07/01	59	214	3	50	20.3	22.0	2	10.91	0	0.00	0	0.00	1	2.45
07/01	59	215	2	50	20.3	20.5	0	0.00	0	0.00	0	0.00	2	11.71
07/01	59	216	1	50	13.6	25.0	0	0.00	3	14.40	0	0.00	25	120.00
07/02	60	217	3	50	13.6	21.0	0	0.00	1	5.71	0	0.00	1	5.71
07/02	60	218	2	50	13.6	20.5	0	0.00	1	5.85	0	0.00	2	11.71
07/02	60	219	2	50	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/02	60	220	1	50	20.3	19.5	1	6.15	4	24.62	0	0.00	4	24.62
07/02	61	221	3	50	20.3	19.5	0	0.00	0	0.00	0	0.00	1	6.15
07/02	61	222	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	8	46.83
07/02	61	223	1	50	13.6	21.0	1	5.71	2	11.43	0	0.00	12	68.57
07/02	61	drift missed due to presence of other fishermen on station												
07/03	62	224	3	50	20.3	21.5	1	5.58	0	0.00	0	0.00	2	11.16
07/03	62	225	2	50	20.3	22.0	0	0.00	1	5.45	0	0.00	0	0.00
07/03	62	226	2	50	13.6	22.5	1	5.33	2	10.67	0	0.00	8	48.00
07/03	62	227	1	50	13.6	24.5	3	14.69	7	34.29	0	0.00	22	107.76
07/03	63													
07/03	63	tide missed due to commercial fishing period												
07/03	63													
07/03	63													
07/04	64	228	3	50	20.3	21.5	0	0.00	0	0.00	0	0.00	0	0.00
07/04	64	229	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/04	64	230	2	50	13.6	21.5	1	5.58	0	0.00	0	0.00	0	0.00
07/04	64	231	1	50	20.3	18.0	1	6.67	0	0.00	0	0.00	3	20.00
07/04	65													
07/04	65	tide missed due to holiday												
07/04	65													
07/04	65													
07/05	66	232	3	50	13.6	20.5	1	5.85	0	0.00	0	0.00	0	0.00
07/05	66	233	2	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/05	66	234	1	50	20.3	17.5	0	0.00	0	0.00	0	0.00	2	13.71
07/05	66	235	1	50	13.6	21.0	2	11.43	1	5.71	0	0.00	40	228.57
07/05	67	236	3	50	13.6	23.5	1	5.11	1	5.11	0	0.00	24	122.55
07/05	67	237	3	50	20.3	22.5	2	10.67	0	0.00	0	0.00	1	5.33
07/05	67	238	2	50	20.3	20.0	1	6.00	0	0.00	0	0.00	1	6.00
07/05	67	239	1	50	13.6	20.0	0	0.00	0	0.00	0	0.00	2	12.00
07/06	68	240	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/06	68	241	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	1	6.00
07/06	68	242	2	50	20.3	19.5	0	0.00	0	0.00	0	0.00	0	0.00
07/06	68	243	1	50	20.3	18.0	1	6.67	0	0.00	0	0.00	1	6.67
07/06	69	244	3	50	20.3	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/06	69	245	2	50	13.6	22.5	0	0.00	1	5.33	0	0.00	11	58.67
07/06	69	246	1	50	13.6	16.0	0	0.00	0	0.00	0	0.00	8	53.33
07/06	69	247	1	50	20.3	19.0	0	0.00	0	0.00	0	0.00	3	18.95
07/07	70	248	3	50	20.3	20.5	1	5.85	1	5.85	0	0.00	0	0.00
07/07	70	249	2	50	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
07/07	70	250	2	50	13.6	20.5	0	0.00	1	5.85	0	0.00	1	5.85
07/07	70	251	1	50	13.6	22.5	1	5.33	3	16.00	0	0.00	18	96.00

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Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery (con't).

Date	Tide No.	Drift No.	Stat. No.	Fath. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook Catch	Chinook CPUE	Sockeye Catch	Sockeye CPUE	Coho Catch	Coho CPUE	Chum Catch	Chum CPUE
07/07	71	252	3	50	20.3	20.5	2	11.71	0	0.00	0	0.00	1	5.85
07/07	71	253	3	50	13.6	21.5	0	0.00	0	0.00	0	0.00	8	44.65
07/07	71	254	2	50	13.6	23.5	1	5.11	1	5.11	0	0.00	17	86.81
07/07	71	255	1	50	20.3	17.5	1	6.86	0	0.00	0	0.00	4	27.43
07/08	72	256	3	50	13.6	25.5	0	0.00	1	4.71	0	0.00	4	18.82
07/08	72	257	2	50	20.3	19.0	0	0.00	0	0.00	0	0.00	0	0.00
07/08	72	258	1	50	20.3	16.5	2	14.55	0	0.00	0	0.00	1	7.27
07/08	72	259	1	50	13.6	18.5	0	0.00	4	25.95	0	0.00	16	103.78
07/08	73	260	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/08	73	261	3	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/08	73	262	2	50	20.3	18.0	0	0.00	0	0.00	0	0.00	0	0.00
07/08	73	263	1	50	13.6	16.5	0	0.00	0	0.00	0	0.00	1	7.27
07/09	74	264	3	50	13.6	20.5	1	5.85	0	0.00	0	0.00	1	5.85
07/09	74	265	2	50	13.6	20.0	0	0.00	1	6.00	0	0.00	3	18.00
07/09	74	266	2	50	20.3	18.0	0	0.00	0	0.00	0	0.00	1	6.67
07/09	74	267	1	50	20.3	17.0	1	7.06	0	0.00	0	0.00	0	0.00
07/09	75	268	3	50	20.3	19.0	0	0.00	0	0.00	0	0.00	0	0.00
07/09	75	269	2	50	13.6	22.0	1	5.45	0	0.00	0	0.00	11	60.00
07/09	75	270	1	50	13.6	20.0	0	0.00	0	0.00	0	0.00	5	30.00
07/09	75	271	1	50	20.3	21.0	0	0.00	0	0.00	0	0.00	0	0.00
07/10	76	272	3	50	20.3	20.5	1	5.85	0	0.00	0	0.00	0	0.00
07/10	76	273	2	50	20.3	20.0	0	0.00	0	0.00	0	0.00	2	12.00
07/10	76	274	2	50	13.6	22.5	0	0.00	0	0.00	0	0.00	15	80.00
07/10	76	275	1	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/10	77	276	3	50	20.3	21.5	2	11.16	0	0.00	0	0.00	0	0.00
07/10	77	277	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	1	5.85
07/10	77	278	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	8	46.83
07/10	77	279	1	50	20.3	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/11	78													
07/11	78	tide missed due to commercial fishing period												
07/11	78													
07/11	78													
07/12	79	280	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/12	79	281	2	50	13.6	18.5	0	0.00	0	0.00	0	0.00	0	0.00
07/12	79	282	1	50	13.6	17.5	0	0.00	1	6.86	0	0.00	2	13.71
07/12	79	283	1	50	13.6	20.0	0	0.00	1	6.00	0	0.00	1	6.00
07/12	80	284	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/12	80	285	3	50	13.6	19.5	1	6.15	0	0.00	0	0.00	1	6.15
07/12	80	286	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/12	80	287	1	50	13.6	16.0	0	0.00	1	7.50	0	0.00	1	7.50
07/13	81	288	3	50	13.6	20.5	0	0.00	1	5.85	0	0.00	1	5.85
07/13	81	289	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	2	12.00
07/13	81	290	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	1	6.00
07/13	81	291	1	50	13.6	18.0	0	0.00	1	6.67	0	0.00	12	80.00
07/13	82	292	3	50	13.6	21.5	0	0.00	0	0.00	0	0.00	0	0.00
07/13	82	293	2	50	13.6	20.5	0	0.00	0	0.00	1	5.85	2	11.71
07/13	82	294	1	50	13.6	17.5	0	0.00	0	0.00	0	0.00	14	96.00
07/13	82	295	1	50	13.6	21.0	0	0.00	0	0.00	0	0.00	3	17.14
07/14	83	296	3	50	13.6	21.5	0	0.00	0	0.00	0	0.00	0	0.00
07/14	83	297	2	50	13.6	19.0	0	0.00	0	0.00	0	0.00	0	0.00
07/14	83	298	2	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
07/14	83	299	1	50	13.6	20.5	0	0.00	0	0.00	0	0.00	14	81.95
07/14	84													
07/14	84	tide missed due to commercial fishing period												
07/14	84													
07/14	84													
07/15	85	300	3	50	13.6	19.0	0	0.00	0	0.00	0	0.00	0	0.00
07/15	85	301	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/15	85	302	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	1	6.00
07/15	85	303	1	50	13.6	21.5	0	0.00	0	0.00	1	5.58	3	16.74
07/15	86	304	3	50	13.6	21.5	0	0.00	0	0.00	0	0.00	0	0.00
07/15	86	305	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	1	5.71
07/15	86	306	1	50	13.6	15.5	0	0.00	0	0.00	0	0.00	0	0.00
07/15	86	307	1	50	13.6	17.5	0	0.00	0	0.00	0	0.00	1	6.86
07/16	87	308	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/16	87	309	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/16	87	310	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/16	87	311	1	50	13.6	21.0	0	0.00	1	5.71	0	0.00	3	17.14
07/16	88	312	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	3	17.56
07/16	88	313	2	50	13.6	19.5	0	0.00	1	6.15	0	0.00	1	6.15

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Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery (con't).

Date	Tide No.	Drift No.	Stat. No.	Fath. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook Catch	Chinook CPUE	Sockeye Catch	Sockeye CPUE	Coho Catch	Coho CPUE	Chum Catch	Chum CPUE
07/16	88	314	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	1	5.85
07/16	88	315	1	50	13.6	17.5	0	0.00	2	13.61	0	0.00	3	20.57
07/17	89	316	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/17	89	317	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/17	89	318	1	50	13.6	17.5	1	6.86	0	0.00	1	6.86	6	41.14
07/17	89	319	1	50	13.6	18.5	0	0.00	1	6.49	1	6.49	5	32.43
07/17	90	320	3	50	13.6	21.0	0	0.00	0	0.00	0	0.00	2	11.43
07/17	90	321	2	50	13.6	19.0	0	0.00	0	0.00	0	0.00	1	6.32
07/17	90	322	2	50	13.6	21.5	0	0.00	0	0.00	0	0.00	0	0.00
07/17	90	323	1	50	13.6	17.5	0	0.00	0	0.00	0	0.00	0	0.00
07/18	91	324	3	50	13.6	20.0	0	0.00	0	0.00	1	6.00	0	0.00
07/18	91	325	3	50	13.6	21.5	0	0.00	0	0.00	0	0.00	1	5.58
07/18	91	326	2	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
07/18	91	327	1	50	13.6	21.5	1	5.58	0	0.00	1	5.58	8	44.65
07/18	92													
07/18	92	tide missed due to commercial fishing period												
07/18	92													
07/18	92													
07/19	93	328	3	50	13.6	21.0	0	0.00	0	0.00	0	0.00	1	5.71
07/19	93	329	2	50	13.6	19.0	0	0.00	0	0.00	0	0.00	0	0.00
07/19	93	330	1	50	13.6	13.0	0	0.00	0	0.00	0	0.00	3	27.69
07/19	93	331	1	50	13.6	16.0	0	0.00	1	7.50	0	0.00	1	7.50
07/19	94	332	3	50	13.6	22.5	1	5.33	0	0.00	0	0.00	1	5.33
07/19	94	333	3	50	13.6	18.5	0	0.00	0	0.00	0	0.00	0	0.00
07/19	94	334	2	50	13.6	18.0	0	0.00	0	0.00	0	0.00	1	6.67
07/19	94	335	1	50	13.6	14.5	0	0.00	0	0.00	0	0.00	2	16.55
07/20	95	336	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/20	95	337	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/20	95	338	2	50	13.6	20.0	0	0.00	0	0.00	1	6.00	0	0.00
07/20	95	339	1	50	13.6	15.5	2	15.48	0	0.00	4	30.97	9	69.68
07/20	96	340	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/20	96	341	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	1	6.00
07/20	96	342	1	50	13.6	17.5	0	0.00	0	0.00	0	0.00	2	13.71
07/20	96	343	1	50	13.6	16.5	0	0.00	0	0.00	1	7.27	1	7.27
07/21	97	344	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/21	97	345	2	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
07/21	97	346	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/21	97	347	1	50	13.6	15.5	0	0.00	0	0.00	0	0.00	1	7.74
07/21	98	348	3	50	13.6	21.5	1	5.58	0	0.00	0	0.00	2	11.16
07/21	98	349	3	50	13.6	20.5	0	0.00	0	0.00	3	17.56	1	5.85
07/21	98	350	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	1	5.85
07/21	98	351	1	50	13.6	21.5	0	0.00	0	0.00	4	22.33	3	16.74
07/22	99	352	3	50	13.6	19.0	0	0.00	0	0.00	0	0.00	1	6.32
07/22	99	353	2	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
07/22	99	354	1	50	13.6	18.0	1	6.67	0	0.00	3	20.00	2	13.33
07/22	99	355	1	50	13.6	17.0	0	0.00	0	0.00	2	14.12	0	0.00
07/22	100	356	3	50	13.6	21.0	0	0.00	0	0.00	3	17.14	0	0.00
07/22	100	357	3	50	13.6	19.5	1	6.15	0	0.00	2	12.31	1	6.15
07/22	100	358	2	50	13.6	21.0	0	0.00	0	0.00	1	5.71	0	0.00
07/22	100	359	1	50	13.6	19.5	2	12.31	0	0.00	1	6.15	1	6.15
07/23	101	360	3	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
07/23	101	361	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/23	101	362	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/23	101	363	1	50	13.6	21.5	0	0.00	0	0.00	3	16.74	4	22.33
07/23	102	364	3	50	13.6	19.0	0	0.00	0	0.00	0	0.00	0	0.00
07/23	102	365	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
07/23	102	366	1	50	13.6	21.0	0	0.00	0	0.00	0	0.00	4	22.86
07/23	102	367	1	50	13.6	18.5	0	0.00	0	0.00	1	6.49	2	12.97
07/24	103	368	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/24	103	369	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/24	103	370	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/24	103	371	1	50	13.6	20.5	0	0.00	0	0.00	1	5.85	0	0.00
07/24	104	372	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/24	104	373	3	50	13.6	18.0	0	0.00	0	0.00	0	0.00	0	0.00
07/24	104	374	2	50	13.6	21.5	0	0.00	0	0.00	0	0.00	0	0.00
07/24	104	375	1	50	13.6	20.5	0	0.00	0	0.00	2	11.71	0	0.00
07/25	105	376	3	50	13.6	22.0	0	0.00	0	0.00	0	0.00	0	0.00
07/25	105	377	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
07/25	105	378	1	50	13.6	18.5	0	0.00	0	0.00	0	0.00	1	6.49
07/25	105	379	1	50	13.6	17.5	0	0.00	0	0.00	0	0.00	1	6.86

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Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery (con't).

Date	Tide No.	Drift No.	Stat. No.	Fath. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook		Sockeye		Coho		Chum	
							Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
07/25	106	380	3	50	13.6	22.0	0	0.00	0	0.00	0	0.00	0	0.00
07/25	106	381	3	50	13.6	21.5	0	0.00	0	0.00	0	0.00	0	0.00
07/25	106	382	2	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
07/25	106	383	1	50	13.6	20.0	0	0.00	0	0.00	2	12.00	1	6.00
07/26	107	384	3	50	13.6	18.0	0	0.00	0	0.00	0	0.00	0	0.00
07/26	107	385	2	50	13.6	19.0	0	0.00	0	0.00	0	0.00	0	0.00
07/26	107	386	2	50	13.6	20.0	0	0.00	0	0.00	1	6.00	0	0.00
07/26	107	387	1	50	13.6	17.5	0	0.00	0	0.00	0	0.00	0	0.00
07/27	108	388	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	
07/27	108	389	2	50	13.6	21.5	0	0.00	0	0.00	0	0.00	0	0.00
07/27	108	390	1	50	13.6	17.5	0	0.00	0	0.00	0	0.00	0	0.00
07/27	108	391	1	50	13.6	17.5	0	0.00	0	0.00	2	13.81	0	0.00
07/27	109													
07/27	109		tide missed due to commercial fishing period											
07/27	109													
07/27	109													
07/28	110	392	3	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
07/28	110	393	2	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
07/28	110	394	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/28	110	395	1	50	13.6	23.5	0	0.00	0	0.00	1	5.11	0	0.00
07/28	111	396	3	50	13.6	17.5	0	0.00	0	0.00	1	6.86	0	0.00
07/28	111	397	3	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
07/28	111	398	2	50	13.6	22.0	0	0.00	0	0.00	0	0.00	0	0.00
07/28	111	399	1	50	13.6	16.0	0	0.00	0	0.00	2	15.00	0	0.00
07/29	112	400	3	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
07/29	112	401	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
07/29	112	402	1	50	13.6	15.0	0	0.00	0	0.00	0	0.00	1	8.00
07/29	112	403	1	50	13.6	19.5	0	0.00	0	0.00	1	6.15	0	0.00
07/29	113	404	3	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
07/29	113	405	3	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
07/29	113	406	2	50	13.6	20.5	0	0.00	0	0.00	4	23.41	0	0.00
07/29	113	407	1	50	13.6	15.5	0	0.00	0	0.00	0	0.00	0	0.00
07/30	114	408	3	50	13.6	18.5	0	0.00	0	0.00	0	0.00	0	0.00
07/30	114	409	2	50	13.6	21.5	0	0.00	0	0.00	4	22.33	0	0.00
07/30	114	410	2	50	13.6	21.5	0	0.00	0	0.00	3	16.74	0	0.00
07/30	114	411	1	50	13.6	22.0	0	0.00	0	0.00	1	5.45	0	0.00
07/30	115	412	3	50	13.6	21.0	0	0.00	0	0.00	5	28.57	0	0.00
07/30	115	413	2	50	13.6	22.0	0	0.00	0	0.00	6	32.73	0	0.00
07/30	115	414	1	50	13.6	16.0	0	0.00	0	0.00	3	22.50	0	0.00
07/30	115	415	1	50	13.6	22.0	0	0.00	0	0.00	4	21.82	0	0.00
07/31	116	416	3	50	13.6	22.5	0	0.00	0	0.00	9	48.00	1	5.33
07/31	116	417	2	50	13.6	23.5	0	0.00	0	0.00	57	291.06	3	15.32
07/31	116	418	2	50	13.6	22.5	0	0.00	0	0.00	53	282.67	0	0.00
07/31	116	419	1	50	13.6	23.0	0	0.00	0	0.00	92	480.00	5	26.09
07/31	117	420	3	50	13.6	18.0	0	0.00	0	0.00	11	73.33	0	0.00
07/31	117	421	3	50	13.6	18.5	0	0.00	0	0.00	4	25.95	1	6.49
07/31	117	422	2	50	13.6	18.5	0	0.00	0	0.00	8	51.89	0	0.00
07/31	117	423	1	50	13.6	20.0	0	0.00	0	0.00	14	84.00	0	0.00
08/01	118	424	3	50	13.6	23.5	0	0.00	0	0.00	37	188.94	1	5.11
08/01	118	425	2	50	13.6	22.5	0	0.00	0	0.00	51	272.00	1	5.33
08/01	118	426	1	50	13.6	18.0	0	0.00	0	0.00	11	73.33	1	6.67
08/01	118	427	1	50	13.6	20.0	0	0.00	0	0.00	3	18.00	0	0.00
08/01	119	428	3	50	13.6	18.0	0	0.00	0	0.00	4	26.67	0	0.00
08/01	119	429	3	50	13.6	20.5	0	0.00	0	0.00	8	35.12	0	0.00
08/01	119	430	2	50	13.6	17.0	0	0.00	0	0.00	2	14.12	0	0.00
08/01	119	431	1	50	13.6	22.5	0	0.00	0	0.00	15	80.00	1	5.33
08/02	120	432	3	50	13.6	28.0	0	0.00	0	0.00	83	355.71	0	0.00
08/02	120	433	2	50	13.6	22.0	0	0.00	0	0.00	53	289.09	1	5.45
08/02	120	434	2	50	13.6	20.5	0	0.00	0	0.00	30	175.61	0	0.00
08/02	120	435	1	50	13.6	19.0	0	0.00	0	0.00	30	189.47	1	6.32
08/02	121	436	3	50	13.6	18.5	0	0.00	0	0.00	14	90.81	0	0.00
08/02	121	437	2	50	13.6	19.0	0	0.00	0	0.00	25	157.89	1	6.32
08/02	121	438	1	50	13.6	22.0	0	0.00	0	0.00	48	261.82	3	16.36
08/02	121	439	1	50	13.6	18.0	1	6.67	0	0.00	7	46.67	0	0.00
08/03	122	440	3	50	13.6	20.5	0	0.00	0	0.00	8	46.83	0	0.00
08/03	122	441	2	50	13.6	23.0	0	0.00	0	0.00	14	73.04	0	0.00
08/03	122	442	2	50	13.6	22.5	0	0.00	0	0.00	22	117.33	0	0.00
08/03	122	443	1	50	13.6	21.0	0	0.00	0	0.00	19	108.57	2	11.43
08/03	123	444	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/03	123	445	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00

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Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery (con't).

Date	Tide No.	Drift No.	Stat. No.	Fath. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook Catch	Chinook CPUE	Sockeye Catch	Sockeye CPUE	Coho Catch	Coho CPUE	Chum Catch	Chum CPUE
08/03	123	446	2	50	13.6	20.5	0	0.00	0	0.00	1	5.85	0	0.00
08/03	123	447	1	50	13.6	14.5	0	0.00	0	0.00	0	0.00	0	0.00
08/04	124	448	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/04	124	449	2	50	13.6	20.0	0	0.00	0	0.00	1	6.00	0	0.00
08/04	124	450	1	50	13.6	20.5	0	0.00	0	0.00	5	29.27	1	5.85
08/04	124	451	1	50	13.6	17.5	0	0.00	0	0.00	1	6.86	0	0.00
08/04	125	452	3	50	13.6	20.0	0	0.00	0	0.00	2	12.00	0	0.00
08/04	125	453	3	50	13.6	20.0	0	0.00	0	0.00	1	6.00	0	0.00
08/04	125	454	2	50	13.6	20.5	0	0.00	0	0.00	2	11.71	0	0.00
08/04	125	455	1	50	13.6	20.5	0	0.00	0	0.00	2	11.71	0	0.00
08/05	126	456	3	50	13.6	20.0	0	0.00	0	0.00	28	168.00	0	0.00
08/05	126	457	2	50	13.6	25.0	0	0.00	0	0.00	30	144.00	0	0.00
08/05	126	458	2	50	13.6	20.5	0	0.00	0	0.00	18	105.37	0	0.00
08/05	126	459	1	50	13.6	17.5	0	0.00	0	0.00	4	27.43	0	0.00
08/05	127	460	3	50	13.6	17.0	0	0.00	0	0.00	8	56.47	0	0.00
08/05	127	461	2	50	13.6	20.0	0	0.00	0	0.00	1	6.00	0	0.00
08/05	127	462	1	50	13.6	19.0	0	0.00	0	0.00	12	75.79	0	0.00
08/05	127	463	1	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
08/06	128	464	3	50	13.6	23.5	0	0.00	0	0.00	83	321.70	0	0.00
08/06	128	465	2	50	13.6	22.5	0	0.00	0	0.00	57	304.00	0	0.00
08/06	128	466	2	50	13.6	19.0	0	0.00	0	0.00	11	69.47	1	6.32
08/06	128	467	1	50	13.6	21.0	0	0.00	0	0.00	31	177.14	1	5.71
08/06	129	468	1	50	13.6	20.0	0	0.00	0	0.00	18	108.00	0	0.00
08/06	129	469	2	50	13.6	21.5	0	0.00	0	0.00	4	22.33	0	0.00
08/06	129	470	3	50	13.6	24.0	0	0.00	0	0.00	22	110.00	0	0.00
08/06	129	471	3	50	13.6	21.5	0	0.00	0	0.00	9	50.23	0	0.00
08/07	130	472	3	50	13.6	24.0	0	0.00	0	0.00	59	295.00	0	0.00
08/07	130	473	2	50	13.6	18.5	0	0.00	0	0.00	25	162.16	0	0.00
08/07	130	474	1	50	13.6	18.0	0	0.00	0	0.00	13	86.67	1	6.67
08/07	130	475	1	50	13.6	23.0	0	0.00	0	0.00	16	83.48	1	5.22
08/07	131	476	3	50	13.6	21.0	0	0.00	0	0.00	6	34.29	0	0.00
08/07	131	477	3	50	13.6	20.0	0	0.00	0	0.00	2	12.00	0	0.00
08/07	131	478	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
08/07	131	479	1	50	13.6	17.0	0	0.00	0	0.00	1	7.06	0	0.00
08/08	132	480	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/08	132	481	2	50	13.6	19.0	0	0.00	0	0.00	0	0.00	0	0.00
08/08	132	482	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
08/08	132	483	1	50	13.6	10.0	0	0.00	0	0.00	1	12.00	0	0.00
08/08	133	484	3	50	13.6	20.0	0	0.00	0	0.00	2	12.00	0	0.00
08/08	133	485	2	50	13.6	20.5	0	0.00	0	0.00	2	11.71	0	0.00
08/08	133	486	1	50	13.6	19.0	0	0.00	0	0.00	20	126.32	0	0.00
08/08	133	487	1	50	13.6	17.5	0	0.00	0	0.00	3	20.57	0	0.00
08/09	134	488	3	50	13.6	18.5	0	0.00	0	0.00	15	97.30	0	0.00
08/09	134	489	2	50	13.6	23.0	1	5.21	0	0.00	62	323.48	0	0.00
08/09	134	490	2	50	13.6	14.5	0	0.00	0	0.00	16	132.41	0	0.00
08/09	134	491	1	50	13.6	17.0	0	0.00	0	0.00	2	14.12	1	7.06
08/09	135	492	3	50	13.6	22.0	0	0.00	0	0.00	11	60.00	0	0.00
08/09	135	493	3	50	13.6	20.0	0	0.00	0	0.00	5	30.00	0	0.00
08/09	135	494	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
08/09	135	495	1	50	13.6	19.5	0	0.00	0	0.00	10	61.54	0	0.00
08/10	136	496	3	50	13.6	21.0	0	0.00	0	0.00	3	17.14	0	0.00
08/10	136	497	2	50	13.6	21.0	0	0.00	0	0.00	6	34.29	0	0.00
08/10	136	498	1	50	13.6	20.0	0	0.00	0	0.00	8	48.00	0	0.00
08/10	136	499	1	50	13.6	19.0	0	0.00	0	0.00	1	6.32	0	0.00
08/11	137	500	3	50	13.6	24.0	0	0.00	0	0.00	11	55.00	0	0.00
08/11	137	501	3	50	13.6	25.5	0	0.00	0	0.00	36	169.41	0	0.00
08/11	137	502	2	50	13.6	15.5	0	0.00	0	0.00	4	30.97	0	0.00
08/11	137	503	1	50	13.6	16.5	0	0.00	0	0.00	14	101.82	0	0.00
08/11	138	504	3	50	13.6	19.5	0	0.00	0	0.00	6	36.92	0	0.00
08/11	138	505	2	50	13.6	19.5	0	0.00	0	0.00	5	30.77	0	0.00
08/11	138	506	2	50	13.6	19.5	0	0.00	0	0.00	7	43.08	0	0.00
08/11	138	507	1	50	13.6	20.5	0	0.00	0	0.00	13	76.10	0	0.00
08/12	139	508	3	50	13.6	20.5	0	0.00	0	0.00	14	81.95	0	0.00
08/12	139	509	2	50	13.6	21.5	0	0.00	0	0.00	6	33.49	0	0.00
08/12	139	510	1	50	13.6	21.0	0	0.00	0	0.00	13	74.29	0	0.00
08/12	139	drift missed due to boat problems												
08/12	140													
08/12	140	tide missed due to commercial fishing period												
08/12	140													
08/12	140													

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Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery (con't).

Date	Tide No.	Drift No.	Stat. No.	Fath. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook Catch	Chinook CPUE	Sockeye Catch	Sockeye CPUE	Coho Catch	Coho CPUE	Chum Catch	Chum CPUE
08/13	141	511	3	50	13.6	18.0	0	0.00	0	0.00	2	13.33	0	0.00
08/13	141	512	2	50	13.6	17.0	0	0.00	0	0.00	0	0.00	0	0.00
08/13	141	513	2	50	13.6	18.5	0	0.00	0	0.00	0	0.00	0	0.00
08/13	141	514	1	50	13.6	17.0	0	0.00	0	0.00	3	21.18	0	0.00
08/13	142	515	3	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
08/13	142	516	3	50	13.6	20.0	0	0.00	0	0.00	4	24.00	0	0.00
08/13	142	517	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/13	142	518	1	50	13.6	19.0	1	6.32	0	0.00	6	37.89	0	0.00
08/14	143	519	3	50	13.6	17.5	0	0.00	0	0.00	1	6.86	0	0.00
08/14	143	520	2	50	13.6	20.0	0	0.00	0	0.00	1	6.00	0	0.00
08/14	143	521	1	50	13.6	17.0	0	0.00	0	0.00	2	14.12	0	0.00
08/14	143	522	1	50	13.6	20.0	0	0.00	0	0.00	6	36.00	0	0.00
08/14	144	523	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/14	144	524	3	50	13.6	18.0	0	0.00	0	0.00	0	0.00	0	0.00
08/14	144	525	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/14	144	526	1	50	13.6	20.5	0	0.00	0	0.00	4	23.41	0	0.00
08/15	145	527	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/15	145	528	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/15	145	529	2	50	13.6	18.5	0	0.00	0	0.00	0	0.00	0	0.00
08/15	145	530	1	50	13.6	19.0	0	0.00	0	0.00	1	6.32	0	0.00
08/15	146													
08/15	146	Tide missed due to commercial fishing period												
08/15	146													
08/15	146													
08/16	147	531	3	50	13.6	18.0	0	0.00	0	0.00	0	0.00	0	0.00
08/16	147	532	2	50	13.6	18.0	0	0.00	0	0.00	0	0.00	0	0.00
08/16	147	533	1	50	13.6	18.0	0	0.00	0	0.00	0	0.00	0	0.00
08/16	147	534	1	50	13.6	15.0	0	0.00	0	0.00	1	8.00	0	0.00
08/16	148	535	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/16	148	536	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/16	148	537	2	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
08/16	148	538	1	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/17	149	539	3	50	13.6	18.5	0	0.00	0	0.00	0	0.00	0	0.00
08/17	149	540	2	50	13.6	17.5	0	0.00	0	0.00	0	0.00	0	0.00
08/17	149	541	1	50	13.6	17.5	0	0.00	0	0.00	4	27.43	0	0.00
08/17	149	542	3	50	13.6	18.5	0	0.00	0	0.00	0	0.00	0	0.00
08/17	150	543	3	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
08/17	150	544	2	50	13.6	22.0	0	0.00	0	0.00	0	0.00	0	0.00
08/17	150	545	1	50	13.6	20.5	0	0.00	0	0.00	3	17.56	0	0.00
08/17	150	546	1	50	13.6	17.0	0	0.00	0	0.00	0	0.00	0	0.00
08/18	151	547	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/18	151	548	3	50	13.6	20.5	0	0.00	0	0.00	1	5.85	0	0.00
08/18	151	549	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/18	151	550	1	50	13.6	16.5	0	0.00	0	0.00	0	0.00	0	0.00
08/18	152	551	3	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
08/18	152	552	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
08/18	152	553	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
08/18	152	554	1	50	13.6	19.5	0	0.00	0	0.00	2	12.31	0	0.00
08/19	153	555	3	50	13.6	21.0	0	0.00	0	0.00	1	5.71	0	0.00
08/19	153	556	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/19	153	557	1	50	13.6	14.0	0	0.00	0	0.00	0	0.00	0	0.00
08/19	153	558	1	50	13.6	22.5	0	0.00	0	0.00	0	0.00	0	0.00
08/19	154	559	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/19	154	560	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
08/19	154	561	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
08/19	154	562	1	50	13.6	19.0	0	0.00	0	0.00	2	12.63	0	0.00
08/20	155	563	3	50	13.6	26.5	0	0.00	0	0.00	0	0.00	0	0.00
08/20	155	564	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/20	155	565	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
08/20	155	566	1	50	13.6	23.0	1	5.22	0	0.00	6	31.30	0	0.00
08/20	156	567	3	50	13.6	21.5	0	0.00	0	0.00	0	0.00	0	0.00
08/20	156	568	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/20	156	569	1	50	13.6	13.0	0	0.00	0	0.00	1	9.23	0	0.00
08/20	156	570	1	50	13.6	14.5	0	0.00	0	0.00	1	8.28	0	0.00
08/21	157	571	3	50	13.6	26.5	0	0.00	0	0.00	0	0.00	0	0.00
08/21	157	572	3	50	13.6	23.0	0	0.00	0	0.00	10	52.17	0	0.00
08/21	157	573	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
08/21	157	574	1	50	13.6	20.0	0	0.00	0	0.00	12	72.00	0	0.00
08/21	158	575	3	50	13.6	18.5	0	0.00	0	0.00	0	0.00	0	0.00
08/21	158	576	2	50	13.6	20.0	0	0.00	0	0.00	1	6.00	0	0.00

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Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery (con't).

Date	Tide No.	Drift No.	Stat. No.	Fath. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook Catch	Chinook CPUE	Sockeye Catch	Sockeye CPUE	Coho Catch	Coho CPUE	Chum Catch	Chum CPUE
08/21	158	577	2	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
08/21	158	578	1	50	13.6	18.0	0	0.00	0	0.00	4	26.67	0	0.00
08/22	159	579	3	50	13.6	22.5	0	0.00	0	0.00	0	0.00	0	0.00
08/22	159	580	2	50	13.6	21.5	0	0.00	0	0.00	0	0.00	0	0.00
08/22	159	581	1	50	13.6	19.5	0	0.00	0	0.00	6	36.92	0	0.00
08/22	159	582	1	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
08/22	160	583	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/22	160	584	2	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
08/22	160	585	2	50	13.6	20.5	0	0.00	0	0.00	1	5.85	0	0.00
08/22	160	586	1	50	13.6	21.0	0	0.00	0	0.00	5	28.57	0	0.00
08/23	161	587	3	50	13.6	21.5	0	0.00	0	0.00	1	5.58	0	0.00
08/23	161	588	3	50	13.6	23.5	0	0.00	0	0.00	6	30.64	0	0.00
08/23	161	589	2	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
08/23	161	590	1	50	13.6	22.0	0	0.00	0	0.00	2	10.91	0	0.00
08/23	162	591	3	50	13.6	20.5	0	0.00	0	0.00	2	11.71	0	0.00
08/23	162	592	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/23	162	593	1	50	13.6	20.5	0	0.00	0	0.00	1	5.85	0	0.00
08/23	162	594	1	50	13.6	14.5	0	0.00	0	0.00	1	8.28	0	0.00
08/24	163	595	3	50	13.6	22.0	0	0.00	0	0.00	0	0.00	0	0.00
08/24	163	596	3	50	13.6	20.5	0	0.00	0	0.00	2	11.71	0	0.00
08/24	163	597	2	50	13.6	22.0	0	0.00	0	0.00	0	0.00	0	0.00
08/24	163	598	1	50	13.6	16.0	0	0.00	0	0.00	1	7.50	0	0.00
08/25	164	599	3	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
08/25	164	600	2	50	13.6	19.0	0	0.00	0	0.00	0	0.00	0	0.00
08/25	164	601	2	50	13.6	19.0	0	0.00	0	0.00	0	0.00	0	0.00
08/25	164	602	1	50	13.6	16.5	0	0.00	0	0.00	3	21.82	0	0.00
08/25	165	603	3	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
08/25	165	604	2	50	13.6	23.5	0	0.00	0	0.00	4	20.43	0	0.00
08/25	165	605	1	50	13.6	21.0	0	0.00	0	0.00	6	34.29	0	0.00
08/25	165	606	1	50	13.6	20.5	0	0.00	0	0.00	0	0.00	0	0.00
08/26	166	607	3	50	13.6	19.0	0	0.00	0	0.00	0	0.00	0	0.00
08/26	166	608	2	50	13.6	17.5	0	0.00	0	0.00	1	6.86	0	0.00
08/26	166	609	2	50	13.6	21.0	0	0.00	0	0.00	4	22.86	0	0.00
08/26	166	610	1	50	13.6	16.0	0	0.00	0	0.00	0	0.00	0	0.00
08/26	167													
08/26	167	tide missed due to commercial fishing period												
08/26	167													
08/26	167													
08/27	168	611	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/27	168	612	2	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/27	168	613	2	50	13.6	19.0	0	0.00	0	0.00	0	0.00	0	0.00
08/27	168	614	1	50	13.6	20.5	0	0.00	0	0.00	4	23.41	0	0.00
08/27	169													
08/27	169	tide missed												
08/27	169													
08/27	169													
08/28	170	615	3	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
08/28	170	616	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
08/28	170	617	1	50	13.6	21.5	0	0.00	0	0.00	6	33.49	0	0.00
08/28	170	618	1	50	13.6	16.0	0	0.00	0	0.00	1	7.50	0	0.00
08/28	171	619	3	50	13.6	21.0	0	0.00	0	0.00	1	5.71	0	0.00
08/28	171	620	3	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00
08/28	171	621	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
08/28	171	622	1	50	13.6	19.5	0	0.00	0	0.00	2	12.31	0	0.00
08/29	172	623	3	50	13.6	19.5	0	0.00	0	0.00	1	6.15	0	0.00
08/29	172	624	2	50	13.6	18.5	0	0.00	0	0.00	0	0.00	0	0.00
08/29	172	625	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
08/29	172	626	1	50	13.6	20.5	0	0.00	0	0.00	1	5.85	0	0.00
08/29	173													
08/29	173	tide missed due to commercial fishing period												
08/29	173													
08/29	173													
08/30	174	627	3	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
08/30	174	628	2	50	13.6	19.5	0	0.00	0	0.00	0	0.00	0	0.00
08/30	174	629	1	50	13.6	21.0	0	0.00	0	0.00	1	5.71	0	0.00
08/30	174	630	1	50	13.6	16.0	0	0.00	0	0.00	0	0.00	0	0.00
08/30	175	631	3	50	13.6	23.0	0	0.00	0	0.00	0	0.00	0	0.00
08/30	175	632	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
08/30	175	633	2	50	13.6	21.5	0	0.00	0	0.00	0	0.00	0	0.00
08/30	175	634	1	50	13.6	20.0	0	0.00	0	0.00	0	0.00	0	0.00

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Appendix A. Catch[a] and drift CPUE for the 1989 Bethel test fishery (con't).

Date	Tide No.	Drift No.	Stat. No.	Fath. Net Used	Mesh Size (cm)	Mean Fishing Time (min)	Chinook		Sockeye		Coho		Chum	
							Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
08/31	176	635	3	50	13.6	20.0	0	0.00	0	0.00	1	6.00	0	0.00
08/31	176	636	1	50	13.6	23.0	0	0.00	0	0.00	3	15.65	0	0.00
08/31	176	637	2	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
08/31	176	638	3	50	13.6	21.0	0	0.00	0	0.00	0	0.00	0	0.00
Total							314	1872.02	301	1723.89	1703	9585.81	1011	5792.54

[a] Appendix A includes fish caught in 13.6 cm (5-3/8 in) and 20.3 cm (8 in) mesh gill nets, therefore, values may vary from those reported in Table 2.

Appendix B. Historic mean date of salmon migration at the Bethel test fish site, 1984-1989.[a]

SPECIES	YEAR	MEAN DATE	VARIANCE
Chinook	1984	21.8 June	99.9
	1985	28.4 June	290.6
	1986	22.2 June	335.2
	1987	23.6 June	464.6
	1988	22.4 June	543.4
	1989	24.3 June	389.0
	Mean (84-88):	23.7 June	346.7
	Median (84-88):	22.4 June	335.2
Sockeye	1984	N.A.	N.A.
	1985	30.4 June	106.8
	1986	26.9 June	221.4
	1987	24.9 June	244.6
	1988	24.3 June	206.1
	1989	24.2 June	193.2
	Mean (85-88):	26.6 June	194.7
	Median (85-88):	25.9 June	213.7
Coho	1984	9.2 August	76.7
	1985	9.6 August	52.4
	1986	9.7 August	248.9
	1987	15.5 August	333.0
	1988	11.4 August	227.6
	1989	5.6 August	173.9
	Mean (84-88):	11.1 August	187.7
	Median (84-88):	25.9 August	227.6
Chum	1984	1.4 July	49.6
	1985	4.1 July	476.7
	1986	2.2 July	362.7
	1987	5.8 July	397.3
	1988	30.8 June	435.9
	1989	30.7 June	349.1
	Mean (84-88):	2.7 July	344.4
	Median (84-88):	2.2 July	397.3

[a] Calculations using adjusted and unadjusted CPUE have the same result.

Appendix C. The 1989 commercial salmon catch (numbers of fish) in District 1 by species and statistical area.

Fishing Period	Date	Statistical Area 335-11				Statistical Area 335-12				Statistical Area 335-13			
		Chinook	Sockeye	Coho	Chum	Chinook	Sockeye	Coho	Chum	Chinook	Sockeye	Coho	Chum
1	06/19	9,204	5,495	0	41,789								
2	06/23	6,011	7,011	0	65,650								
3	06/26	1,264	2,568	0	27,353	519	951	0	3,765	79	227	0	1,255
4	06/30	4,657	5,220	0	89,995	4,216	4,711	0	37,225	359	283	0	4,409
5	07/03	2,704	3,029	0	59,213	1,680	2,358	0	29,202	216	421	0	2,930
6	07/05	2,039	1,892	3	57,982	1,142	877	0	25,295	130	148	0	2,450
7	07/08	1,427	1,503	3	72,751	1,555	1,435	6	41,998	154	239	0	4,317
8	07/11	905	765	101	42,111	706	664	25	32,086	80	136	0	3,856
9	07/14	663	402	125	18,826	458	322	96	20,824	95	72	9	4,751
10	07/18	506	290	1,568	17,507	336	122	608	7,935	26	39	40	965
11	07/27	125	57	4,518	3,187	74	36	985	2,162	11	2	148	367
12	08/03	77	24	31,829	1,503	79	5	50,074	1,669	18	1	17,119	443
13	08/07	38	13	32,079	373	31	9	36,286	472	9	0	5,149	23
14	08/09	19	7	78,655	126	19	0	22,924	297	2	0	1,579	9
15	08/12	15	5	42,785	49	16	3	34,481	66	3	0	4,704	7
16	08/15	12	2	7,022	28	13	2	14,095	91	0	0	1,954	0
17	08/18	4	5	3,489	9	3	0	1,945	7	0	0	504	0
18	08/23	14	11	12,904	16	2	2	16,037	5	3	1	1,999	0
19	08/26	12	11	11,837	7	4	1	8,027	8	1	1	1,017	0
20	08/29	4	8	4,562	9	2	1	5,817	12	1	0	701	0
21	09/01	2	1	1,702	6	1	0	1,390	1	0	0	133	0
TOTAL		29,702	28,319	233,182	498,490	10,856	11,499	192,796	203,120	1,187	1,570	35,056	25,782

Appendix D. Historic cumulative catches, mean tidal CPUE's, adjustment factors, and adjusted mean tidal CPUE's for salmon caught in the Bethel test fishery.[a]

Species	Year	Cum. Catch	Cum. CPUE	Adjustment Factor	Adjusted Cum. CPUE
Chinook	1984	231	273.13	3.4444	940.77
	1985	79	114.11	5.7359	654.52
	1986	127	201.08	3.5694	717.73
	1987	384	581.98	4.0423	2,352.54
	1988	238	360.97	5.7648	2,080.92
	1989	314	523.41	b	b

				Mean: 4.5114	
Sockeye	1984	267	579.38	b	
	1985	694	1,654.28	2.1318	3,526.59
	1986	869	2,445.30	1.7028	4,163.86
	1987	943	2,761.03	1.6568	4,574.47
	1988	583	1,500.55	1.9524	2,929.67
	1989	256	800.93	b	b

				Mean: 1.8610	
Coho	1984	2,152	3,057.23	2.6527	8,109.91
	1985	1,091	1,575.36	3.8487	6,063.09
	1986	2,714	4,099.17	2.2266	9,127.21
	1987	1,227	1,990.52	4.1352	8,231.20
	1988	1,989	3,159.75	2.5515	8,062.10
	1989	1,703	2,451.28	b	b

				Mean: 3.0829	
Chum	1984	1,186	2,386.52	4.4842	10,701.63
	1985	616	1,327.37	3.9702	5,269.92
	1986	1,688	4,065.91	1.9438	7,903.32
	1987	2,302	4,897.60	2.8911	14,159.45
	1988	2,107	5,188.91	6.2654	32,510.60
	1989	937	2,609.53	5.0003	13,050.33

				Mean: 4.0925	

[a] Adjustment factors were calculated based on relationships between declines in the test fishing CPUE's and associated downstream catches.

[b] Adjustment not possible.

Appendix E. Historic commercial salmon catch from statistical areas 335-11, 335-12 and 335-13 of the Kuskokwim management area.

Year	Statistical Area 335-11				Statistical Area 335-12				Statistical Area 335-13			
	Chinook	Sockeye	Coho	Chum	Chinook	Sockeye	Coho	Chum	Chinook	Sockeye	Coho	Chum
1984	20,229	45,276	332,679	385,178	9,717	1,295	272,419	10,853				
1985	18,146	53,395	168,192	116,832	17,885	50,655	161,233	73,843				
1986	9,329	46,505	301,093	169,958	9,181	46,670	342,096	134,243				
1987	32,182	82,130	226,229	329,748	13,415	52,046	159,053	232,995				
1988	40,355	60,168	290,872	861,433	12,540	27,127	199,036	453,012	915	2,469	18,509	47,537
1989	29,702	28,319	233,182	498,490	10,856	11,499	192,796	203,120	1,187	1,570	35,056	25,782